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AN APPROACH TO THE SHORT-PERIOD ANALYSIS OF PRIMARY-PRODUCING ECONOMIES[1]

By DUDLEY SEERS

THE attention of economists was mainly devoted, in the 1930's and 1940's, to analysing economic fluctuations in the industrial countries. Since the war, dynamic theories, dealing with the *growth* of developed economies and the *development* of the remainder,[2] have attracted more interest. Not much theoretical attention has ever been paid, however, to the analysis of short-period fluctuations in the world outside the industrial countries of North America and Western Europe.[3]

We have to omit, as a separate problem, the question of analysing the centrally planned economies of the Soviet bloc. But there are still quite large areas of the world left: Central and South America (including the Caribbean), Africa, the Middle East, South-East Asia, and Oceania. And, although the subject of short-period analysis is rightly considered trivial, in comparison to the perspectives of dynamic economics, it is nevertheless one which concerns many of us in one way or another.

The problems that cause most worry to the governments of primary producing countries, and on which they must frequently seek advice, are not those of long-period growth, but of economic survival month-by-month. Moreover, one can hardly start on the task of making long-run projections without first getting what clues one can from seeing how the economy has worked in the recent past. What, for example, have been the sources of savings? How (and why) have they varied? The long-period coefficients needed for development programming will of course be different from short-period ones. Still the development planner will need all the help he can get from short-period analysis.

[1] This paper is based on a series of lectures given at an International Economic Association course, for economists from the countries of South-East Asia, at Singapore in the middle of 1956. I am grateful to those attending the seminars, both as teachers and as students, for much constructive criticism. I should also make the traditional disclaimer that this paper represents only my own views and not necessarily those of my present employers, the Economic Commission for Latin America.

[2] Following Mrs. Hicks's distinction (*Oxford Economic Papers*, Feb. 1957).

[3] One contribution in this field is 'The Short-run Problem of Growth in Under-developed Countries' by Henry J. Bruton (*Kyklos*, vol. x, Fasc. 3). However, Mr. Bruton's paper is concerned, as the title suggests, only with short-run factors in as far as they influence long-run development plans. It is moreover an essay in metaeconomics: various characteristics are assumed valid for 'underdeveloped' economies (for example, that there is no spare capacity in either land or capital, and that governments have a 'considerable capacity for mismanagement and corruption'), and general principles for policy are derived from these assumptions, without reference to conditions in any particular economy. Finally, the class of 'under-developed' economies is not identical with the class of primary producers.

It is necessary to dispose of one point first. That is the question of statistics. Many of those who have worked east of Suez (or south of the Rio Grande) will say that one has in fact little choice in one's analytical technique, because the statistics available, and their reliability, will decide what, if anything, can be done. There is of course a point in this objection, but nevertheless it is not very relevant. One should, surely, try in the first place to make up one's mind how one would handle a job of analysis, assuming that one had all the statistics one needed. Anyone who starts by basing his work on what statistics are available, may easily fall into the trap of thinking that the important factors are those which can be measured. In any case, as I believe will be shown by this paper, statistics do not play quite such an important part in analysis, when one is dealing with primary producers. Moreover, as it happens, economic theory suggests an analytical approach which can in fact usually be carried out, at least in part, with the statistics to be found in such economies.

The first part of this paper starts by trying to show why primary-producing economies cannot be handled in the same way as the industrial economies of Western Europe and North America, and why it is not very helpful even to ask the same questions. The step from analysing one type of economy, which has been made familiar by lectures, textbooks, research, and indeed everyday life, to another type entirely different, is not an easy one. We first have to realize what a big step it is. The paper opens by describing the characteristics of an industrial economy, e.g. the United States, which permit the sort of aggregative analysis familiar to us, and which are indeed assumed in the analytical techniques we use. It then goes on to show that, because of specialization in production, cultural diversity, short-run supply in elasticities, and changing institutions, these assumptions are rarely valid for primary producers. Such a comparison is inevitably rather laborious; but it brings out into the open some of the difficulties that one feels intuitively in handling the problems of primary-producing economies, and so is the sharpest way of demonstrating why one cannot use the same techniques—why the General Theory is, geographically at least, a Special Theory. This section is not entirely negative, however: in the process of making this comparison, I try to indicate the sort of factors which are often important, and worth examining.

The second part of the paper deals with the question of how great a shift in approach is necessary. It is argued that there is not one type of analysis suitable for industrial economies, and another for primary producers. By asking whether one can find in various economies the characteristics which are assumed in the usual model of an industrial economy, we can classify them in groups, for each of which a basically different approach is needed.

The model assumed in analysis of the United States is at one extreme of a great variety of model types, and an oil sheikhdom at the other. As one moves along this range one finds that aggregative analysis is less and less useful, and that one has increasingly to supplement it by paying special attention to particular commodities.

Lastly, a brief section discusses the implications for those concerned with short-period policy. It is suggested that the more closely an economy resembles that of the United States the more successful its counter-cyclical policy is likely to be.

I. The Fundamental Differences between Analysing Industrial and Primary-producing Economies

(*a*) Assumptions Underlying Analysis of Developments in the United States.

The purest example of an industrial economy, at least for analytical purposes, is the economy of the United States. Let us start by examining how, in broad outline, its fluctuations are usually analysed.

Most economists handle this job by going through categories on the demand side one by one—consumption expenditures, capital investment, government expenditure, the export surplus. Particular attention is usually paid to capital investment. The export surplus is quantitatively small, and is in any case partly a function of the movements in output we are trying to explain. Government expenditure is more important, but in the post-war period its fluctuations from one year to the next have only rarely been very large, and they have been paralleled (with some delay) by changes in taxation which largely offset their impact. Consumption is a variable which is almost wholly dependent on the others. So one looks first to investment—business outlays on plant and equipment, residential construction, inventory changes—as the main source of inflationary or deflationary pressures, as the prime mover in the economy.

One can conduct the analysis, moreover, in these fairly broad categories, and indeed write a book about the United States economy, without going into greater detail than, perhaps, splitting consumption into purchase of durables, non-durables, and services, or distinguishing between primary, secondary, and tertiary production. We need not concern ourselves with what happened to particular industries, or particular racial or religious groups, still less particular states.

This is because American industry is diversified, its culture is homogeneous, and its market is a single unit.

No one industry is of such importance as to require special attention. It is true that different industries show different distributions of their sales proceeds between wages, profits, and materials. An increase in the sales

of refrigerators has a different effect on tax revenue, or saving, or imports, from an increase in the sales of shirts or of steaks. But the number of industries is so great that differences in their individual experiences can usually be ignored at the 'national' level of analysis. Many industries show structures not very dissimilar to the national average, and in any case the ebb-and-flow of economic life will benefit some labour-intensive industries (for example), while others are declining. It is even possible to treat the special features of the American agricultural sector and of the oil industry as economically trivial at a certain level of abstraction.

Similarly, although there are, of course, cultural differences between various groups in the United States, they do not appear to be economically significant. An Irish Catholic shopkeeper does not have the same attitude to the earning and spending of money as a Negro Episcopalian teacher or a free-thinking farmer of Scandinavian descent. But again, for most economic purposes, one can ignore the differences. In broad, the reactions of Americans are the same. Their tastes are created, shaped, and controlled by the same advertising and journalistic influences. Americans of all types watch Lucille Ball and Arthur Godfrey, and read the *Saturday Evening Post* and the *Reader's Digest*. And firmly rooted pecuniary ambitions ensure a conventional supply curve for every industry—a rise in payment per unit of time or energy usually extracts greater effort. The significance of the marginal differences that do exist is once more obliterated by the scale of the economy. It is extremely unlikely that economic changes would benefit exclusively, or even mainly, groups with a high propensity to save, or a great preference for leisure.

One can likewise proceed a long way without having to take account of regional differences. Most states are fairly well diversified themselves, so that they are likely to gain directly from an increase in military expenditure, or suffer somewhat from decline in the demand for clothing. Yet there is also a large volume of trade between the various states, which are knit together by swift and cheap communications. A local boom spills over into the rest of the economy, as soon as output approaches the limits of local capacity. Moreover, Federal taxes siphon off surplus incomes in areas growing prosperous, and Federal social security grants help support levels of living in those suffering from a recession.

What makes it particularly easy to ignore structural features is the elasticity and self-sufficiency of the American economy. During ordinary peace-time conditions, there is spare capacity in both labour and capital. By altering hours of work, and by hiring or discharging marginal workers (such as married women willing to work part-time), any industry or region can easily adjust its output to changes in demand. The nation only depends on imports for a comparative small proportion of its supplies, and

these are mostly raw materials, of which inventories are large (in the case of 'strategic' materials, very large). Structural factors consequently do not hinder the response of the economy, within certain limits, to exogenous factors. Of course, in a special period, like war-time, such limits may be exceeded, and structural factors become more important. Otherwise, however, the American economy is free to respond widely and quickly, to (say) changes in the rate of interest or in mortgage regulations for veterans' housing.

Finally, these responses are not profoundly different in one decade from another. The collective taste of the public is of course in a state of flux, with the promotion of new products, and both the income structure and the transport system are continually changing. At times the mechanism of price support for farm products is altered, and so are the coverage and amounts of social security benefits. The scope and terms of consumer credit never remain constant for long. But none of these variations transform the working of the whole economy beyond recognition. There is some pattern evident over a number of years in the interactions between the broad categories used in aggregative analysis. This pattern is not usually, nowadays, considered stable enough to permit exact quantitative forecasts to be made. Moreover, even at the 'national' level, ignoring industrial or regional detail, the system is complex. But still much can obviously be learned about the short-term working of the American economy without bringing institutional changes into the picture. One can therefore proceed by treating the whole economy as an analysable entity. In fact one has to work mainly in aggregative terms, if one is to understand how the economy has functioned, for otherwise the task is unmanageable. It is therefore both useful and necessary to put questions such as: What has been happening to total investment? What effect has this had on the national product?

(*b*) The Relevance of these Assumptions for Primary Producers

Now the main point of this part of the paper is that one cannot achieve a great deal by treating a primary-producing economy as an entity in itself, still less by putting such questions. And fundamentally the reason is that the features of the American economy, described above, are not generally to be found in this type of economy.

(i) *The Significance of Exports*

For nearly all primary-producing economies, agricultural or mineral, the level of exports, not investment, is the biggest influence on the demand side. Not only are exports usually numerically greater in value, but they also fluctuate more violently. Investment is moreover very largely endogenous. One could argue that even in industrial economies investment is in part endogenous, particularly if one takes account of social factors such as

population changes, but still it can be treated, in the short run, as exogenous for the purposes of most purely economic analysis. This is not true for primary producers. Fixed-capital investment depends mainly on the profits of exporting companies, or the yields of export duties: and inventory investment is largely involuntary, for reasons which will be explained below. Exports on the other hand are in the short run almost a wholly exogenous factor for most primary-producing countries,[1] and indeed one can say that in a sense only such economies have factors truly exogenous. Furthermore, investment usually means payment for imported capital goods rather than for local resources.

(ii) *The Importance of Particular Commodities*

For them, therefore (in contrast to the United States), we have to look first to the behaviour of exports. But—and this is the clue to the difference in approach—not to the behaviour of exports in general. What we have to examine is the exports of *particular commodities.*

Malaya provides a good example. This country will be discussed not because it is typical (it will be argued later that there is no such thing as a typical primary producer, and that different primary producers have to be handled differently) but because it illustrates the argument very clearly.

When dealing with Malaya, we find not only that changes in exports are far more important than changes in capital investment, but that exports of rubber and tin have to be considered separately.[2] It will be seen from the table of Malayan statistics that rubber exports have been the more volatile of the two. Further repercussions are also different for the two commodities. In both cases, a rise in exports increases government revenues because of the heavy export duties, and income tax. However, over the period of 1949–53 covered by the table, the total of duties and cesses on tin amounted to a high, but constant, level of about 15 per cent. of the value of exports, whereas the total duties and cesses on rubber were lower, but more variable, because the schedule of export duties is more steeply progressive with respect to price changes.

But it is when we consider the distribution of the remainder of export income that the difference between the two export commodities becomes really important. In the case of rubber, a large fraction of the output, about 40 per cent., is produced (and processed) on smallholdings, defined as holdings of less than 100 acres (in practice usually less than 10 acres).[3]

[1] Exceptions are countries exporting staple foods or textiles with an important home-market—e.g. Burma (rice) or Mexico (cotton). In such cases, the volume exported will depend, even in the short period, partly on the pressure of internal demand.

[2] This would be still more obvious if the two commodities had followed very different courses. Over the period under consideration, both rubber and tin experienced a sharp and short-lived boom due to the Korean war.

[3] The facts quoted in this paragraph are taken from the Report of International Bank

TABLE I

*Malaya: Selected Statistics showing the Roles of Rubber and Tin, 1949 to 1953**

(million dollars, Malayan)

	1949	*1950*	*1951*	*1952*	*1953*
Exports of domestic products:					
Rubber	558	1,522	2,279	1,277	898
Tin	241	412	506	470	351
Others	144	195	266	226	237
All exports	943	2,129	3,051	1,973	1,486
Net profits, dividends, &c., payable overseas†	150	590	700	220	120
Consolidated ordinary government revenue, Federation:					
Rubber export duties‡	33	97	219	116	61
Tin export duties‡	39	52	77	70	52
Income tax and estate duties	41	49	129	224	160
Other sources	214	271	371	374	392
All sources, Federation	327	469	796	784	665
„ Singapore	137	144	211	247	285
Total	464	613	1,007	1,031	950
Government current expenditure	440	460	730	950	1,005
Government capital investment:					
Federation	71	59	111	167	156
Singapore	21	32	57	84	79
Total	92	91	168	251	235
Private fixed capital formation	215	240	325	405	340
Inventory investment:					
Rubber inventories	−15	+30	−60	+ 5	−10
Tin inventories	+40	−85	+ 5	− 5	+ 5
Other inventories	+45	−35	+20	+100	+30
All forms	285	150	290	505	365

Source: Economic Development of Malaya (published for the International Bank by Johns Hopkins Press, Baltimore, 1955).

Note: $1 million Malayan = £117 thousand, sterling.

* Includes Singapore.

† The whole of profits, after tax, without deduction for reinvestment in Malaya.

‡ Including research cesses.

These are mostly cultivated with family labour, or on a share-cropping basis. Some of the estates are company-owned, but both private and company estates pay out a large fraction of their receipts as wages and salaries. Consequently, even if one allows for the difference between the export price

Mission, *The Economic Development of Malaya* (Baltimore, 1955), and refer to 1953. Some peasant rubber is processed in factories.

and the price received by the grower, a big share of the value of rubber exports flows directly into the economy as personal income.[1] The tin industry, however, is quite differently organized. All the smelting has been done by only two smelters, and mining itself (almost wholly alluvial) is very heavily capitalized. A single dredging site requires about £1 million to equip it, or the best part of $10 million (Malayan), and even a gravel pump costs over $100 thousand, installed.[2] Electricity and rent are heavy items in costs, whereas wages are relatively light. The number of people occupied (in 1947) in all types of mining, including not only tin but also coal, stone quarries, &c., amounted to less than one-tenth of the number occupied in rubber cultivations. So tin profits are high in comparison to wages. The government was (at this time) taking 30 per cent. of these profits in a profits tax. The remainder is divided between foreign companies (who own most of the dredges) and local Chinese firms (who own nearly all the gravel pumps). The flow of tin income into local households is therefore relatively small. The contrast is even greater when we consider the *marginal* rather than the *average* distribution of income. Personal incomes generated in the rubber industry would be more sensitive to changes in the value of output than incomes in the highly mechanized tin industry. (Rubber wage-rates appear to follow the export price fairly closely, and a change in volume of output involves a change in the size of the labour force tapping the trees.)

Consequently fluctuations in rubber exports have quite different effects on the remainder of the economy from fluctuations in tin exports. Moreover, changes in the *volume* of either export have different effects from changes in export *prices*: changes in price lead to more-than-proportionate changes in profits (especially for tin), much of which flows overseas, and more-than-proportionate changes in government revenues (especially for rubber), whereas changes in volume, at least for rubber, do not affect the distribution of export incomes so greatly. In the case of Malaya, therefore, the first questions to ask are, not questions about capital investment or even total exports, but: what has been happening to the price and to the volume of exports of rubber? What has been happening to the price and to the volume of exports of tin?[3]

[1] The Bank Report states that, according to the Mission's inquiries, the smallholder receives 90 per cent. of the Singapore price, but warns that this takes no account of 'undergrading' by dealers. However, dealers' income is itself mostly personal income.

[2] Rather over 50 per cent. of output is produced by dredges, nearly 40 per cent. by gravel pumps.

[3] In practice, a good deal of an economist's work in these countries is taken up examining the forces that determine volumes and prices of export commodities. This leads to studying movements in overseas commodity markets, foreign inventory policies, trade and payment agreements, &c. But these are outside the scope of this paper, which treats export movements as given.

Then, in order to proceed further, one has to know how the industries producing these commodities are organized. One has to deal with institutional questions which do not concern the economist analysing developments in the United States. What percentage of the output of a major exporting industry is produced by peasants (or private miners), and what percentage by plantations (or company mines)? What are the scales of export duties and corporate taxes? What are the economic roles of the buying agent and the export broker? What wages are paid by the plantations, mines, and processing factories? Does increased output require overtime to be worked or more workers to be hired? What fraction of total profits is distributed? What proportion of dividends is paid to overseas shareholders? One cannot start putting together a picture of the mechanism by which the fluctuations in export incomes are transmitted to the internal economy until one has discovered the answers to questions such as these.

But one cannot expect stability in this mechanism. It may be profoundly changed from one month to the next by a new wage agreement, or by alterations in rates of dividends paid by a single important company, or by adjustments to export duties, and still more profoundly by structural changes like the closing down of a big factory, or the splitting up of a large estate into peasant holdings. Such events transform the relationship between exports and, for example, consumer incomes. This means that analysis is as much a matter of assessing the significance of events in key sectors, as of discovering how the economy operates between these events. In fact the economy may well not remain unchanged long enough to yield sufficient statistics for its operation to be measured at all accurately.[1]

We can now see why statistical weaknesses and gaps need not prevent economic analysis being carried out. The research involved is institutional as well as statistical (in the ordinary sense), and the statistics that are needed are, in the first place, the statistics of the quantities and prices of various exports and of the operations of export companies, marketing boards, &c. Fortunately these are precisely the types of statistics which are almost always available in such economies, and they are usually among the better of the official series.

(iii) *Special Influences on Consumption*

Cultural diversities. So far the discussion has only been about the first stage of income generation. When the next stage is reached, additional complications appear. Taking personal incomes first, the saving propen-

[1] One might say that 'short-period' analysis, in the conventional sense of analysis assuming a given stock of capital and given institutional arrangements, is hardly possible for such economies. Strictly of course, it is not possible in industrial economies either. The point is that one has to put greater weight on the short-period effects of 'long-period' changes when dealing with primary producers.

sities and consumption patterns are often completely different between different regions, often because of racial differences. In the case of Malaya, for example, the tin industry is largely concentrated in the two adjoining States of Perak and Selangor (producing over 91 per cent. of the 1954 output between them), and employs a largely Chinese labour force: the rubber industry, however, stretches the length of the western seaboard, and employs appreciable numbers of Malays, Chinese, and Indians. Consequently changes in personal incomes earned in the two industries have quite different secondary effects on the markets for food, clothing, &c. Sometimes, where the various races have all been assimilated into the society, the question of racial composition can be ignored. But one can find several examples where it is economically significant. If an increase in Nigerian exports is attributable to groundnuts, it affects the Moslem tribes of the Northern region, such as the Hausa, whereas changes in incomes from bananas, cocoa, and palm oil affect a variety of tribes in the British Cameroons and Eastern and Western Regions, which are racially and climatically quite different.

A recent study, by Miss O'Loughlin, has used a number of sources to build up a picture of the sources of income, and also of the composition of expenditure, for each of the three main racial groups in one economy—Fiji.[1]

It can be seen from Table II, where her results have been rather drastically summarized, that the Fijians are mainly engaged either in subsistence farming or in copra, whereas the Indians dominate sugar and other cash crops. The Europeans draw a certain amount of the copra proceeds (as proprietors' profits) and share with the Indians nearly all the income arising in secondary and tertiary industries. The average income of the Europeans is somewhat higher than the other groups (particularly if one allows for the smaller families), and food expenditures only absorb about one-fifth of it. A very high proportion (over 70 per cent.) of the incomes of Fijians is spent on food, but this is somewhat misleading: it reflects, in part, the consumption of subsistence foods, for which other commodities could not be substituted. If we take only cash income, we find that a higher proportion is spent on other goods by the Fijians, and particularly by Europeans, than by Indians. In fact the report shows that the former races each spent, at least in the year 1952, more than 10 per cent. of their cash income on drink and tobacco and about 20 per cent. on

[1] Sources include census results, tax statistics, labour and health department reports, company records, rating valuations, crop returns, nutrition and budget surveys and trade statistics. See *The Pattern of the Fiji Economy*, by Carleen O'Loughlin, Colony of Fiji Council Paper 44/56. (A fourth and much smaller group, the Chinese, has been omitted here.) Actually, the economy of Fiji seems to be less severely divided racially, from the viewpoint of economic analysis, than many other 'plural societies'. For one thing, the various races live close together. However, no other economy is, so far as I know, documented in this way.

clothing, much higher percentages than for the Indians. Such commodities are mostly imported. Consequently, it seems *a priori* likely that an increase in exports of sugar, for example, benefiting primarily the Indians, would lead to a bigger increase in food expenditure and local incomes, than would an increase in exports of copra.[1]

TABLE II

Fiji: Personal Income and Expenditure, by Racial Group, 1952

	*Europeans**	*Fijians†*	*Indians*	*Total‡*
Occupied Population ('000)	6·5	42·9	46·2	97·7
Personal income, before tax (£m., *Fiji*):§				
Industry of origin:				
Copra (cash)	0·5	1·5	0·1	2·1
Sugar, &c. (cash)	0·2	0·7	3·0	3·9
Subsistence agriculture	—	4·2	1·2	5·5
Other industries	2·4	1·9	3·6	8·5
Total	3·1	8·3	8·0	20·1
Personal expenditure (£m., *Fiji*):				
Commodity group:				
Food (cash)	0·5	1·3	2·4	4·2
Food (non-cash)	—	4·2	1·2	5·5
Clothing and other goods	1·5	1·7	2·3	8·0
Domestic services, rent, transport	0·5	0·6	0·8	
Total	2·5	7·7	6·7	17·7

* Includes part-Europeans. † Includes other Islanders.

‡ Expenditure of Chinese residents, of missions, and of tourists is also included in this column.

§ Excludes company profits, amounting to £1·9m., almost entirely arising in non-agricultural activities, and also dividends from overseas, amounting to £0·3m.

Note: £100 Fiji = about £90 sterling.

Source: The Pattern of the Fiji Economy, by Carleen O'Loughlin. Colony of Fiji Council Paper: 44/56.

Inelasticities of supply of imports. Unravelling the influences on the demand for consumer goods is, moreover, only part of the task. One also has to take account of short-period inelasticities in this supply. Inventories are usually thin, except for food (which will be considered separately below), because holding them is expensive in the (typical) case where interest rates are high.[2] Local manufacturing capacity is bound to be limited, and in many cases it is negligible: all primary-producing economies depend to a large extent on imports of certain manufactures. It may there-

[1] Of course, further-order effects may modify the picture somewhat. Thus part of the Indians' expenditure will create incomes for Europeans and Fijians.

[2] Thus in Brazil, the value of wholesalers' inventories were generally (in the years 1955–7) equivalent to less than 1 month's sales (see *Inquéritos Econômicos, seriatim*).

fore take weeks to replenish inventories, if one counts not only the time spent in sea transport, but also further delays in unloading and transporting goods into the interior (including delays in customs warehouses). A system of import control may delay replenishment indefinitely, when foreign exchange reserves are low. From an analytical point of view, these structural obstacles mean long and variable time-lags between change in exports and the corresponding changes in consumption. Thus the large upsurge in wool incomes in Australia (in 1950–1) led to increased consumption which still ran at high levels in the following year, by which time the export boom had subsided.[1] Similarly, the ports, railways, and roads were inadequate in 1948–50 to supply goods to the inland districts of Ghana quickly enough to absorb the increase in cocoa farmers' incomes. During these delays there is likely to be a pressure of excess demand in local markets.

Inelasticities of food supply. The consumption of food is determined by quite different considerations. In fact, the volume consumed may not be determined in the short run by demand at all, but rather by supply. This is true for economies where the transport facilities are too poor for surpluses in the local food harvest to be exported, or for shortages to be made good.[2] Then the volume of consumption and the internal price-level may well depend on rainfall or other climatic factors, rather than on movements in export incomes.[3] Suppose that, because of a bad crop, food output fell relative to personal incomes derived from other sectors. Analysing the effects we are brought up against questions of organization once more. How much of the rise in prices is gathered by speculators and middlemen? How does it affect rents, wages, and peasants' incomes? Is food mostly produced on smallholdings, or on big estates? And how does the food farmer act when prices rise—does he cut his own consumption down with the object of becoming rich, or does he increase it, content to receive a constant cash income and to grow fat? Is there a large subsistence sector which can supply the cash market in times of scarcity?

This last question is important for many 'underdeveloped' primary producers. Where there is such a reserve supply of food, the amount delivered to the cash market will depend on the price obtainable. Food supplies in the cash market will then show some elasticity and prices will be more stable. We will, however, for purpose of analysis, not be indifferent to the

[1] See *World Economic Report, 1953–4* (United Nations), pp. 42–43.

[2] A shortage of foreign exchange may also prevent food being imported on a sufficient scale to make up for bad harvests.

[3] An exception is formed by certain small highly-specialized export economies, usually islands or seaboard economies, which depend on imports of staple foods. In these cases (such as Barbados or Singapore) the economics of the consumption of food is not essentially different from that of the consumption of other goods (except that usually the sources of supply are nearer to hand, so that inventory fluctuations may be less violent).

question of whether the incomes derived from food sales are flowing to the 'subsistence' sector or to the usual cash food farmers, because the further results will be very different in each case.[1] Often, however, there is no such subsistence sector to draw on, or it is situated too far from the cash economy, or transport is not available. The supply of food then tends to be inelastic, and consequently the market is sensitive to movements both in the size of the cash food crops and in export incomes.[2]

The food market is one of the most complicated, but also the most important parts of the analysis of a primary producer. It is particularly complicated in cases where a country is an exporter of staple foods—such as the traditional rice exporters, Burma and Thailand. Then the value of exports cannot be taken as determined *outside* the economy, even in the shortest of short runs. A rise in the world price may mean either a higher or lower volume exported, according to the national elasticity of supply—the relation between changes in prices and volumes of exports. This in turn depends partly on the elasticity of supply of the farming sector, but also, since a large fraction is sold in local urban markets, on the connexion between incomes in the countryside and the towns, and on the income and price elasticities of urban demand.

Because of its peculiarities, the food market often shows conditions quite different from the market for other consumer goods—one may suffer from an excess of demand, while the other is depressed. Food is also a commodity far more important than any other: typically it accounts for over 50 per cent. of consumption in primary-producing economies. It therefore almost always has to be handled as a separate category of analysis.

Regional fragmentation. Quite different conditions can also exist in the food markets of different regions (or in the regional markets for other consumer goods). Export industries are often concentrated in particular areas, and an increase in demand may not easily spread into the surrounding territory. Transport difficulties may partially seal off one area from the rest of the country (the Northern region in Nigeria, for example), and civil war disrupts at times the economies of many primary-producing countries, especially in Asia (including of course Malaya). Finally fiscal systems are much less effective as mechanisms for evening out local differences than they are in industrial economies. They are almost always weaker, and in some cases they are also decentralized. Thus the new Federal Government of the British West Indies has a revenue of less than £2 million—of the

[1] This case is examined by S. P. Schatz in 'Inflation in Underdeveloped Areas' (*American Economic Review*, Sept. 1957).

[2] High wages in an export industry may also spread to other agricultural sectors, helping to raise prices. Another possible consequence is that, where there is mixed farming, success with the export crop may lead to neglect of the food crop. (This happened in Ghana when cocoa prices rose.)

order of one-tenth that of the Jamaican or Trinidadian Government, and one-fiftieth of the value of exports.

For primary producers, therefore, one has to know what are the staple foods and where they originate, how the transport system is organized, what are the sources of supply of manufactures, what racial and regional divisions there are, and the nature of the fiscal system, before one can begin to understand changes in consumption.

(iv) *Special Influences on Private Investment*

The fact that, as is usually obvious enough, investment is endogenous does not mean that there is a simple, or quantifiable, function connecting changes in incomes and the corresponding changes in investment. The speed and extent of the reaction of fixed-capital investment to higher profits depends on many factors. A long-term programme of corporate investment may be in process. In this case (particularly if the companies concerned are large ones, developing new sources of supplies—such as aluminium companies developing bauxite) the rate of investment will probably be unaffected by short-run changes in export profits. Or alternatively investment may remain stagnant in a boom: the physical scope may be limited, or company managers may feel that long-term prospects are poor. Investment by peasants, however, is likely to follow changes in income more closely.[1]

Dependence on mobility of capital. For any of these reasons, an industry's investment may not match the savings that arise within it. But also of course the investment possibilities of the prosperous export industries may attract savings either from abroad, or from other sectors of the economy. The former is an external factor, outside this paper's scope. To study internal flows of capital, one has to look at the working of the financial system to see if surplus savings in one sector are easily transferred to others. Do companies keep their balances in the country or outside? How are personal savings banked? What restrictions are there on the portfolios of savings banks? Are there special farm loan agencies? How do the commercial banks treat increases in deposits?

This opens up the whole question of how the foreign exchange system is organized. Provided the export of capital is either difficult or unattractive, there is at least some tendency for accumulations of export profits to drive down the rates of interest and stimulate investment in other sectors.[2] But in countries which offer limited possibilities for invest-

[1] Peasant investment may not require much finance (e.g if it consists of digging ditches, cleaning land, &c.) but it is likely to be sensitive to short-run price changes as indicators of market prospects.

[2] Another way in which savings may be transferred is for internal price rises to absorb increases in incomes in the export sectors.

ment, and also leave the foreign exchange market free (such as Cuba), extra savings may have little or no effect on the local capital markets, and tend to flow overseas. A special case under this heading is that of the British colonies: these are on a 'sterling exchange standard', allowing free capital movement to other sterling-area countries. Managers of banks (usually affiliated to Barclay's or Canadian banks) base their policies and interest rates on those applying overseas, and hold large balances abroad, so that variations in export profits affect mainly these balances and have little effect on other sectors of the local economy.

In countries with a developed banking system, monetary policy may also have a considerable influence on the level of private investment, especially inventory investment. In fact this is perhaps more important an influence than it is in industrial countries. The potential yield on invested capital is generally so great that any act of government policy which, deliberately or otherwise, increases the money supply, often exerts a noticeable stimulus on the level of investment. Under this heading come government deficits which are covered by increases in the currency issue directly or indirectly (e.g. by Central Bank advances), reductions in the reserve ratios of commercial banks, &c.[1]

There are two additional complications in the determination of investment, which I can only mention in passing. One is that nowadays, because of the government grants or loans to development banks and corporations, and the practice of giving tax concessions to new industries, part of an increase in *public* revenue may indirectly lead to higher *private* investment. Secondly, the demand for imports may be kept in check by controls: then the extent to which an improvement in exports generates a rise in fixed-capital or inventory investment, and also the industry where that investment occurs, will depend on decisions by import controllers, as well as on changes in the financial resources available. (Fixed-capital investment in these economies can be almost completely frustrated by the lack of import permits for types of plant and machinery not available locally).[2]

Forms of inventory investment. The last type of investment to consider is that in inventories. Changes in *export* inventories may be of substantial importance, but they fit very badly into any scheme of analysis, and in fact tend to mask the mechanism by which export incomes reach the internal

[1] On the other hand, some writers over-emphasize monetary factors as causal influences, and use variations in the 'means of payment' as the main or sole explanation of short-period changes in demand (as one of many examples, see *Conjuntura Economica*, Rio de Janeiro, Oct. 1957). This partly reflects an old-fashioned quantity-theory approach, and partly the fact that banking statistics are usually much more highly developed in such countries, by comparison to statistics of other sectors.

[2] The further effects of changes in investment depend greatly on whether such changes are in construction or in purchases of equipment, especially for economies which manufacture few capital goods but do have cement factories (e.g. Jamaica).

economy. Private or government marketing agencies may, for example, build up inventories out of big crops, in order to prevent prices declining. This may sustain internal incomes, even though the value of exports has fallen.[1] Increases in inventories on the farm may also be important. If these are largely or wholly financed by the government, the economic effect is much the same as inventory-building in government warehouses. Otherwise they are only treated by farmers as representing spendable income to an extent which is limited, and also difficult to assess (since it depends on the availability of private credit and on market prospects).

Investment in *import* inventories usually tends to fall when export incomes arise, and vice versa, because of the delays in importation discussed above. The extent and duration of such an involuntary decline in these inventories will depend on the time it takes to replenish them with supplies from overseas. In the case of an involuntary rise, because of a slump in exports, the deciding factor in the duration may well be the ease with which import contracts can be broken. A second major influence on investment in import inventories is expectations of price changes—especially in countries experiencing price inflation and the instability in exchange rates which accompanies it.

(v) *Special Influences on Government Expenditure*

Because of the difficulty of levying income tax in most primary-producing areas, export duties are often the mainstay of the budget (though they may appear in the budget in the guise of royalties or of government profits from foreign exchange transactions or from commodity marketing operations). Other taxes too, however, depend more or less closely on the performance of incomes in the export sector.

Delays in response to export fluctuations. Changes in government current expenditure are not usually large enough to be of great economic significance in primary-producing economies, except for cases where social services are highly developed (as in Australia and New Zealand) or military expenditure is high (for example, Burma and Malaya).[2] Government capital formation tends to be more sensitive to fluctuations in revenue. For example, when the primary products boom of 1950–1 increased tax revenues substantially, governments used a large fraction of the rise to start work on (long-cherished) development projects. The subsequent decline in export prices was also widely reflected in a decline in public investment. But a delay between an increment in prices and in investment depends on many factors. On the upgrade, the quickness of the response

[1] The classic case has been the purchase of coffee by Brazilian and other Latin American governments, or producers' organizations, at various times.

[2] Part of the military expenditure may be financed by direct grants from foreign governments, in which case the primary-producing economy is in effect exporting military services.

depends *inter alia*, on the state of blueprints, the availability of other sources of capital, the delays in obtaining imported capital goods, the political programme of the party in power (including its ambitions for extending services), and the energy and efficiency of the administration. It also depends on how quickly tax revenue rises, which depends in turn on what form it takes, because income taxes are usually collected at least a year after they arise. (See the Malayan table.) The downturn is even more unpredictable, depending on the nature of the projects which have been set in motion (since governments are most unwilling to abandon large projects, such as aerodromes, or dams, half-built), and on the willingness and ability of governments to continue the programme by other means of finance.

Currency regulations. Governments of these countries usually have limited liquid reserves, and their borrowing capacity, both internally and overseas, is often also small in comparison to the level of their investment expenditure. The question of how closely the latter follows export incomes depends, therefore, mainly on whether the governments concerned are willing, and if willing, able to finance development by expanding the fiduciary part of the currency issue. Colonies are generally prevented by metropolitan countries from doing this,[1] and in other cases—mostly those with freely convertible currencies—there are constitutional or conventional limitations on the money supply. Moreover, even where there are no such limitations, the attempt to maintain an increased rate of investment, after export incomes have fallen back, may mean a critical deterioration in foreign reserves, or—if that is avoided by use of exchange controls—a heavy pressure of excess demand in the internal market. In either event the government may find it difficult to keep up a high level of investment.[2] This is therefore a factor which is only to a limited extent independent of fluctuations in export incomes, even in the short run.

(vi) *Special Influences on Overseas Payments*

The various changes in consumption and investment result eventually in changes in imports or (more generally) in overseas payments. Fluctuations which enter the economy through its exports finally flow out again as fluctuations, though of course not necessarily of the same magnitude, in payments for imports of goods and services.

Profits of foreign companies. There is one short cut in the process. Changes in the value of exports are often reflected in the profits of foreign

[1] The rules of the 'sterling exchange' standard, mentioned above, have checked currency expansion in the past, though these rules are now being relaxed by the Colonial Office.

[2] Current expenditure is usually slower to rise in an export boom, but it also proves subsequently much more difficult to reduce, if revenues decline. (Many underdeveloped countries, especially in Latin America, have got into difficulties by expanding the armed forces or civil services during an export boom.)

companies, which are of course on the opposite side of the balance-of-payments account. Such offsetting fluctuations in imports of services are especially noticeable in the oil economies, but also in all economies dependent on capital-intensive processes developed by foreign companies (see the table of Malayan statistics, p. 7).

Systems of exchange. The reaction of merchandise imports will be affected by all the forces described above. But changes in foreign economic policy may also be important. Violent declines in the exports of countries without considerable reserves of foreign exchange usually lead to the establishment of exchange controls, where these are not already being used, or alternatively sharp rises may make it possible for the government to abolish such controls. If foreign exchange transactions are permanently controlled, as in many countries of this type, total payments move in steps more or less parallel to exports, and about 6 to 12 months behind them (Brazil is a case in point). Residual fluctuations in the demand for imports are then left inside the economy, to affect local prices. In a number of countries, the level and structure of imports are also affected by periodic or continuous adjustment of the exchange rate. This may of course in the first place affect the value of exports in domestic currency, assuming that the same rates are used for both exports and imports.[1] Our concern here is that such changes in the exchange rate may also, as they have done in Mexico, modify the working of the process of income generation by making local manufactures cheaper in relation to imports. For these reasons movements in imports are not usually wholly explicable in terms of changes in the demand for them, and one has to add the foreign exchange régime to one's list of research topics.

(vii) *General Analytical Implications*

When dealing with all the second-stage repercussions on consumption and investment, and the ultimate impact on imports, certain lines of inquiry are therefore suggested. They are essentially questions about the structure of the economy, about those of its characteristics which prevent consumption, investment and imports responding regularly, rapidly, and predictably to changes in exports.

Moreover, just as institutional developments may modify the immediate impact of changes in exports on incomes, so they may also modify the way in which changes in incomes in turn affect consumption, investment, government expenditure, and imports. The whole mechanism of a primary producer is usually unstable. In the first years of a good cocoa price, the farmers of Ghana tended to spend their money on bicycles, gramophones, and other light durables, whereas in the late 1940's there seemed to be some

[1] Otherwise the spread of exchange rates is an important factor in analysis.

switch towards housebuilding. At the same time the habit of eating wheat bread, a habit presumably irreversible, spread through the country, raising the propensity to import. In different economies, the opening of railway lines or road bridges, the establishment of banks, the adoption of new regulations on the issue of currency, a change in the scope of import control, the ending of an insurrection—all these may profoundly affect from one year to the next the way in which consumption and investment, and thus imports, are affected by changes in exports.

Such local economic events are therefore of major importance at all stages of analysis. They are not drowned in a flow of events of comparable importance, as they are in industrial countries. It follows that the job of analysing cannot be done at a distance, or merely with a statistical digest. For real insight, and particularly for prediction, one has to talk to people in various industries, and perhaps in various regions. Research has to be correspondingly qualitative, as well as quantitative. One has to ask local experts to describe export marketing arrangements, the administration of exchange controls, the fiscal machinery, the composition of the consumer market, the monetary system and the rules on which banks operate—and also the significance of changes, recent or expected, in these features of the economy.

Manipulation of the conventional aggregates is hardly likely to be fruitful. The very fact that the output and consumption of food (and also of course the output of many types of exports) depend largely, if not mainly, on changes in the weather or on crop diseases, will alone frustrate this approach. Moreover, one can get an illusory sense of having conducted an economic analysis merely by explaining changes in the national product in terms of expenditure items—something which is always possible, provided the national accounts balance, but may in fact tell one very little.

It is hard to find a suitable metaphor for the fundamental difference, for this purpose, between an industrial economy and a primary producer. The essential distinction is perhaps between an integrated and a fragmentary economy. Both types are of course fragmented in various ways. But, for the industrial economy, one steps back to a distance at which the detail blurs, and can be ignored, so that the economy can be handled as a single organism, as a thing-in-itself. The key to short-period analysis of a primary producer lies in examining closely the fragments which are strategically significant, and their inter-relation—probably the main export industry, the central government, and (in countries enjoying monetary independence) the banking system.[1] The act of simplification which makes analysis

[1] For example, in Colombia the key questions are the size and distribution of coffee incomes, the extent to which the Federación Nacional de Cafeteros borrows from or lends to the banking system to finance inventories, the advances of the central bank to the government, &c .

possible in industrial economies is to ignore the fragmentation: in primary producers, it is to select the fragments which matter.[1]

II. The Range of Short-Period Economic Models and the Statistics they Need

Some model is assumed in all economic analysis. The model is not always, in fact not usually, explicit, or even consciously realized. The selection of statistical series to quote, or the arguments for a particular type of budgetary or trade policy, does however imply a view about the way the economy works, and the relative importance of various forces. The thesis of the first part of this paper has been that the type of economic model implied in the usual approach to an industrial economy is not suitable for a primary producer.

The division of the non-Soviet world into 'industrial' countries and 'primary producers' is itself, however, rather questionable. A moment's reflection shows that the approach described above as applicable to the United States economy is not wholly suitable for all industrial economies, nor are all primary producers like Malaya. From the point of view of analytical technique, there is a range of economies.

No attempt will be made to discuss all the economies of the world. They would each in fact require separate, and detailed, attention. It may be useful, however, to discuss one or two types of economy, which are fairly common, to list a few examples of each type, with statistical illustrations, and to suggest the categories suitable for analysis and the statistical systems these categories would need. The basis of the classification is in the first place the extent of diversification, and secondly (amongst the primary producers) the number and organization of the leading exports. It would be possible to classify primary producers in other ways, for example according to the different ways in which the food market is organized, or the extent to which the economy is 'open', but none of these seem to me to provide as useful a basis of classification, since the starting-point of analysis is the distribution of export incomes.

(*a*) Industrial Economies

(i) *The United States*

This has been discussed above. This economy is an extreme case, as the mostly highly diversified economy, primarily industrial, almost self-sufficient, containing a large number of industries, integrated into a single market with respect to culture and geography, flexible and rapid in its responses to stimulating or depressive impulses.

[1] Some of these conclusions apply to long-period analysis and programming as well.

(ii) *Other Large Industrial Economies*

Some modification of economic treatment (and thus of statistical policy) is necessary when one has to deal with other industrial countries. The economy of the United Kingdom, for example, has many features in common with the United States. It too has a large number of industries, and culturally and geographically it can perhaps be considered even more completely unified than the United States. But this economy is of course less self-sufficient, and analysis may be complicated by developments overseas, such as the closing of the Suez Canal in 1956. It also seems to have less elasticity. This was shown during the Korean war. The United States rearmament programme of 1951 to 1953, although on a relatively bigger scale, was handled fairly easily, whilst that of the United Kingdom involved extra demands for commodities already scarce (especially steel). The 1951 Budget attempted to release resources for rearmament by reducing consumer incomes. The consequence was that the economy split into two sections—on the one hand the metal-using industries, with heavy order books, and on the other light consumer goods industries, such as textiles, experiencing a recession and unemployment. This meant that it was not very helpful to treat the economy as a whole—one had, for most purposes, to descend to at least groups of industries. A change in the purchase tax in textiles had an entirely different effect on the economy from a change in the purchase tax on cars. It is interesting to note that the official 'inter-industry' research programme was started at this time, leading to the publication of separate income-and-expenditure accounts for groups of industries, which are compatible with the aggregative accounts, and which make it possible therefore for analysis to descend from the aggregative level to a level at which industry groups are considered separately. Nevertheless it is usually possible to get quite a long way with purely aggregative analysis. This also seems to be true of other large industrial countries. Subject to similar qualifications, one can handle (analytically) France, Italy, Japan, and West Germany in the same way, and for much the same reasons.

The composition of this group is worth some consideration. Japan is included, whereas Australia and Sweden are omitted, because the basis of the division of countries (from the viewpoint of this paper) is not one of income. I have not been contrasting the way to analyse *rich* countries with the way to analyse *poor* countries (or 'developed' and 'underdeveloped'). The question is whether certain structural characteristics are present, and how important these are. There is, of course, some correlation between these characteristics and income—richer countries tend to show more economic and less cultural diversity, to be less dependent on foreign trade, to have better transport systems, to have more spare manufacturing

capacity, and so on. But the reasons are complex, and the associations are not very strong.

It could be argued that the basic question is not merely industrialization either. The share of income arising in agriculture is about the same in the United Kingdom and the United States. One could imagine a highly specialized industrial country, which lived by exporting very few products and which would have to be treated, analytically, as a primary producer.[1] In fact, however, predominantly industrial countries, even poor ones like Japan, do tend to be more diversified. One reason for this is that they always have some agriculture and some mining (the availability of iron and coal having been, at least until recently, a pre-condition of industrialization). Moreover, a wide range of secondary industries is necessary to make an advanced manufacturing product like a motor-car. A primary producer, on the other hand, tends to concentrate on a few products which are favoured by geological and climatic advantages. Furthermore, industrial economies tend to be much more completely knit together by transport systems, precisely because of their diversification.[2] So the association is much stronger between industrialization and the structural characteristics which are important, than between these characteristics and average income.

(iii) *Smaller and Less Well-balanced Industrial Economies*

One other common feature about the last class of economies is that they are all fairly large countries. This is of course itself also related to industrialization, and, although there are small industrialized countries, one finds that, in practice, the economy tends then to be rather unbalanced. This calls for a rather different analytical approach. None of the economies of less than 20 million inhabitants is really fully diversified. The Canadian economy, for example, is by now highly industrialized and in some respects rather like a small version of the United States. There is one outstanding difference, however, and this is that exports of wheat have a more important strategic role in the Canadian economy than the exports of any industry in the United States. One cannot go far in dealing with the Canadian economy before one has to discuss wheat, and especially (in recent years) the change in the 'carryover', unsold at the end of the crop, because of marketing difficulties. Although one can use aggregative analysis on Canadian problems, it needs to be supplemented by questions about wheat exports and investment in wheat inventories, which would be of an importance comparable to that of questions about fixed-capital investment. Statistically this

[1] The dockyard economies, such as Malta, might be classed as examples of this. However, it is questionable whether naval repairs are secondary or tertiary activities. These economies are, moreover, very special cases and need not be allowed to confuse the fundamental issue.

[2] Typically, the roads and railways of primary producers flow, like rivers, towards the sea.

implies that it would be useful to supplement a conventional set of national accounts with a table showing the consolidated income and expenditure of the wheat sector. Sweden is another small industrial country, quite highly diversified, but with a major export industry (forest products), requiring special attention within predominantly aggregative analysis.[1]

(*b*) Primary-producing Economies

(i) *Single-mineral Economies*

The oil sheikhdoms. Let us now go to the other end of the range. The most extremely specialized primary producers are the oil economies, seen in their purest form in certain sheikhdoms of the Middle East. These economies are completely dominated by the oil sector, consisting usually of a single oil company. Consumer and capital goods are almost all imported, though there are of course small local service industries as well—import agencies, domestic services, laundries, legal firms, prostitutes, &c. The market for consumer goods and services is split between the royal household, the technical experts and administrators (mainly foreign), and the remainder of the population—each of these three categories differing enormously in their levels of living, and in the composition of their personal budgets. Capital investment in drilling, schools, roads, housing, &c., is ultimately financed by oil profits, but the timing of investment is determined by two people—the oil company manager and the sheikh—since the oil profits will be split, perhaps about equally, between corporate profits and the sheikh's royalties. If either of these two men is replaced, the fraction of saving devoted to investment may alter drastically. Substantial increases in the personal incomes of any group are saved involuntarily, until imports can arrive from overseas.

Let us now ask ourselves how we would apply conventional aggregative analysis in such circumstances. (Let me hasten to add that this would be obviously so absurd that hardly any economist would attempt it: the object of the exercise is not to knock down some mythical opponent, but to bring out in the sharpest way possible analytical difficulties which are not at all so obvious in more complex primary-producing economies.) Suppose, *per impossible*, that we had completely reliable national product series for several years, showing consumption, investment, government current expenditure (i.e. outlays by the sheikh for social and military purposes), and the foreign balance. What features about this table would strike us as strange? First that the national product fluctuates rather violently, being affected by the severity of the technical problems in the local oil industry,

[1] An interesting case in this category is Belgium, because it too has a leading export industry, important enough to warrant special attention, and this industry is a secondary one—steel.

by the state of the world oil market, and by high company policy on which of their various oilfields to exploit. Consumption may climb rapidly in such an economy, or it may remain more or less constant. There is no particular reason to anticipate that it will reflect movements in the national product or in exports. Oil company wages and salaries are not likely to be greatly affected by short-period changes in output; and, although the sheikh's income is likely to vary, he probably has sufficient reserves to spend as much as he pleases, irrespective of such variations. For the same reason we would not expect 'government current expenditure' to reflect changes in the national product in the short-run. Capital investment, private or government, will move irregularly, according to whether major projects are starting or finishing. The foreign balance will simply be a residual, representing that part of the oil receipts not remitted abroad as profits, or spent (by the company, by the sheikh, or by the public) on imports of capital or consumer goods. It will fluctuate erratically—though round a level that will be fairly high, if a large portion of the oil royalties is being invested overseas.

There appear to be no statistics which illustrate the operation of an oil sheikhdom.[1] However, Iraq illustrates some of the points made above (except of course, that royalties are paid to a government, instead of a personal ruler) (Table III). This brings out the stability and lowness of both employment and the wage-bill in the oil industry, in contrast to the large and volatile incomes of the government and of oil companies.

From a technical point of view, we cannot use the national product to 'explain' short-period changes in the expenditure items for such an economy, any more than we can treat the national product as a variable dependent on any combination of expenditure items. A conventional national income and expenditure table is therefore not suitable for economic analysis. It conceals, rather than reveals, the way in which the economy works.

This is not surprising, because the word 'oil' does not appear on such a table, and an account without the word 'oil' would obviously be of very little help to anyone trying to find out how the economy of one of these sheikhdoms worked. We would in fact do better to start with an income-and-expenditure account for the oil industry, showing how its receipts (almost entirely from exports) are divided between wages, salaries, imported

[1] There are, however, some regional totals which are relevant. Royalties paid to Middle East sheikhs and governments amounted to U.S. $880 million in 1955 and U.S. $940 million in 1956 (*Economic Developments in the Middle East: 1955–6*, United Nations), whereas the total outlay including royalties, wages, and other local expenses amounted to 'over $1 billion' in 1954 (Standard Oil press release, 23/1/56). Of the total revenue of Kuwait, 97 per cent. has been derived from oil royalties (*Economic Developments in the Middle East: 1954–5*, United Nations). Special fractions of oil revenues are reserved for the personal use of rulers in Bahrein, Qatar, and Saudi Arabia.

supplies, depreciation, the sheikh's royalties, and corporate profits. We would take a step further forward, if we constructed tables showing how each of these expenditures is itself spent by the recipient. It would be helpful to construct two tables for the sheikh—one corresponding to the political side of his activities, and the other to the personal. The first (which may in fact exist as a separate account) would show as receipts not only part of the oil royalties, but also other taxes, and as outlays the current expenses of public administration: the second would be an income-and-

TABLE III

An Oil Economy: Iraq, 1951–3

(millions of dinars, except where otherwise indicated)

	1951	*1952*	*1953*
Oil statistics:			
Crude oil exports	37	83	126
Wages and all other local current payments by oil companies	6	7	n.a.
Imports by oil companies	9	14	13
Oil royalties, &c., paid to government*	13	37†	51
Oil profits remitted abroad by companies	18	42	51
Oil companies' capital inflow for investment	7	13	−3
Crude oil production (millions of metric tons)	8	19	28
Number of oil employees (thousands, at end of year)	11	13	13
Purchases of electricity by oil companies (millions of KWh)	11	39	91
Other statistics:			
Other exports	135	123	123
Increase in official overseas reserves	—	11	22
Government revenue from other sources*	32	29	32
Government expenditure*:			
Budget	31	44	44
Development Board	4	16	20

Source: Economic Developments in the Middle East, 1945 to 1954 (United Nations).

* Fiscal year, starting 1 April.

† Includes 5 million dinars in respect of previous years.

Note: 100 dinars equals £1 sterling.

expenditure account of the royal household.[1] Proceeding further in the same way we would arrive at a statistical system with the following interlocking accounts:[2] oil industry (current), government (current), other

[1] How one divides the oil royalties between the political and personal accounts makes little practical difference. One would probably arrange that all 'savings' occurred in the personal account, on the grounds that if the sheikh were deposed, he would probably still manage to keep the accumulated past royalties.

[2] 'Interlocking' in the sense that an item on the outlay side of one account would reappear as a receipt item on another.

industries (current), sheikh's household, households of expatriates, other households, oil (capital), government (capital), other capital, rest of world.

It might of course not be feasible in practice to construct such a system, and even if feasible, it would almost certainly not be worth the trouble for such a small and simple economy. But this is what one would really need if one wanted to follow the flow of oil incomes through the economy. The nearer one approached it, the easier would it be to see how the economy worked. Even the first account, for the oil industry (current), would at once tell us a great deal of what we want to know. Such a system of accounts would not be essentially different from the system of 'national accounts' that is now common.[1] It would be an extension of the conventional system, made by breaking accounts that are economically significant out of it, i.e. by showing separate production and investment accounts for the key industry (oil), and separate household accounts to correspond to radically different consumer markets.

Aggregative statistics could be derived from these sectoral accounts, if one so desired, but they would be of little interest. The average *per capita* income of such diverse social groups might double from one year to another, and indeed rise higher than that of the United States, without any visible improvement in the conditions of the great majority of the people.[2]

Even a system of statistics showing industrial and social detail, such as I have outlined, would only be of limited use. One would still not be able to get far without a knowledge of the royalty agreements in force at various times, company and royal welfare policies, the disposition of the reserves of the royal treasury, and the sheikh's visits to other territories.[3] Economic analysis would consist of an assessment of such developments: it would have to be illustrated by, rather than based upon, a set of statistical accounts.

The oil sheikhdom has been chosen as an extreme example of limited professional interest in practice, but illustrating vividly the shift of analytical and statistical approach which may be necessary, when one is dealing with a primary producer. The remaining economies fall between this and the industrial economies discussed at the beginning of this part of the paper. Other primary producers require a shift of approach that is similar—but not so great.

[1] e.g. *A System of National Accounts and Supporting Tables* (United Nations). In fact the system outlined would not present much greater statistical difficulties than a conventional national income and expenditure account. If one could compile the latter at all accurately, one would have nearly all the items necessary for this system.

[2] In any case, it would be held by most people that certain goals, of eliminating ignorance and disease in such communities, are of overwhelming importance. Changes in income, however widespread, unaccompanied by such social advances, may well leave the community in a condition that would be considered by many people worse, not better.

[3] These might profoundly affect the balance of payments.

Larger oil economies. Nearest to the oil sheikhdoms are a number of economies which are also specialized oil producers, although less highly so (and show a less feudal stratification of the consumers' market). These include Trinidad and Venezuela, economies with agricultural and industrial sectors, the outputs of which, however, are not worth a great deal in comparison with oil. When dealing with developments in such economies, one cannot get very far before one mentions oil, and the statistics one uses should include, whatever else there may be, separate tables for the current and capital accounts of the oil industry.

Other single-mineral economies. A stage more diversified are certain other economies exporting a single mineral, which accounts for a large fraction of total exports (and for that matter of total output), but without such an overwhelming influence on the economy as oil has in the cases mentioned above.[1] Examples are Bolivia (tin), Central African Federation (copper), Chile (also copper), Surinam (bauxite). In all these cases government current expenditure and capital investment, and for that matter all current and capital expenditures, depend very largely on exports of the commodity mentioned, although the direct effect of the industry on employment and personal income is small (see Table IV, giving details for Chile). Economic analysis, and any system of statistics, therefore starts with a table of the income and expenditure of the industry producing this commodity.

(ii) *Monocultures*

From our present point of view, the economies which are 'monocultures', or nearly so, can be treated in much the same way; for them, too, any model has to be built around the leading export.

Single-plantation monocultures. The long list of such economies includes a number of special types. One is the (rare) case where the economy is dominated by a single commodity, and a large proportion is produced by a single firm—for example, Honduras (with the United Fruit Company banana plantations) and Liberia (with the Firestone Corporation rubber plantations). These can be called single-plantation economies. They have many of the characteristics of an oil sheikhdom, in that the most important statistics are those of the operations of the leading company, and also that company policies and agreements with the government are of major significance for economic analysis. Personal incomes generated in export industries are, however, much more important for this group.

Monocultures with guaranteed export prices. Another sub-species is of monocultures whose export prices have been stabilized by international

[1] Big oilfields usually have an output the value of which is out of all proportion to that of the other economic activities in a primary-producing country.

agreement, and whose exports (and national income) are therefore in the short-run largely a function of the size of the crop, and thus of climatic factors. The most obvious cases here are of the monocultures covered by the Commonwealth sugar agreement, Barbados and Mauritius. The relative stability achieved in the whole economy because of a stable export

TABLE IV

A Single-mineral Economy: Chile, 1950–4

(billions of Chilean pesos, at 1950 prices, except where otherwise indicated)

	1950	*1951*	*1952*	*1953*	*1954*
Copper statistics:					
Copper exports (f.o.b.) . .	12·9	13·7	19·0	14·5	14·0
Copper profits, &c., retained overseas	−4·0	−3·7	−3·1	−2·3	−3·3
Imports by copper companies .	−1·4	−2·2	−2·0	−1·6	−1·1
Net foreign exchange from copper	7·5	7·8	13·9	10·7	9·5
Total government tax receipts from copper . . .	6·4	7·1	12·3	9·1	8·0
Copper labour force (thousands)	14	14	15	16	14
Other statistics:					
Other exports (f.o.b.) . .	13·8	16·0	14·2	18·0	17·8
Other current government revenue	18·0	19·6	20·5	20·4	18·2
Current government expenditure	10·1	10·4	11·4	13·4	12·9
Subsidies and other transfers .	12·8	12·8	21·4	18·0	13·9
Government investment . .	4·3	5·1	5·8	5·1	5·2
Total employed population (thousands) . . .	2,179	2,232	2,289	2,342	2,384

Source: Economic Bulletin for Latin America, January 1956 (United Nations, Santiago).

Note: In 1950 purchasing power, 1 billion Chilean pesos approximately equalled $(U.S.) 12 million. A 'billion' is defined as in the United States.

price is brought out strikingly by the figures for Barbados in Table V. Because of the International Sugar Agreement and the United States Sugar Act, Cuba shows the same characteristics, modified however by the greater diversity of the economy and greater price fluctuations.[1] These economies

[1] In all such cases there are quotas for the exports covered by the respective agreements, and in the case of Cuba output above the quota is often added to inventories. There is one feature of the Commonwealth Sugar Agreement worth mentioning here: the formula used for determining the export price makes it depend largely on the costs of production. This not only stabilizes the export price, therefore, but also (in a large degree) the terms of trade.

happen to be relatively homogeneous, free of major transport problems, and with liberal exchange systems. Provided, therefore, distribution of the value of sugar output can be roughly determined (and the basic formula of the Commonwealth agreement is a good clue), so that an income-and-expenditure account can be drawn up for the sugar industry, economic analysis of developments in these countries is fairly straightforward.[1]

TABLE V

A Monoculture with Guaranteed Export Prices: Barbados, 1951–4

($B.W.I. million)

	1951	*1952*	*1953*	*1954*
Sugar statistics:				
Sugar exports* (f.o.b.)	30	34	33	33
Imported materials for sugar industry	5	6	6	6
Local purchases for sugar industry	3	3	3	3
Sugar levies for welfare funds, &c.	3	3	3	2
Sugar profits, wages, and salaries	19	20	21	23
Other statistics:				
Other merchandise exports	3	4	6	5
Merchandise imports (c.i.f.)	52	54	46	49
Fixed capital formation	14	13	11	11
Government current spending	8	8	9	10
Private consumption	55	56	57	59

Source: Barbados Statistical Service, *Abstract of Statistics*, No. 1, 1956 (Government Headquarters, Bridgetown), based mainly on estimates by Sir Archibald Cuke.

Note: ($B.W.I.) 4·80 = £1 (sterling).

* Includes molasses, and the value of Special Preference Certificates.

Marketing-board monocultures. A third sub-species is of monocultures where the export price is free to vary, but the domestic ex-farm price is pegged by a marketing board (or by highly progressive export duties). Such are the cases of Burma (rice) and Ghana (cocoa). Although the internal buying price often ch ,s from year to year, it is normally retained during each crop year, and even year-to-year fluctuations have been much smaller than variations in the world price. As in the previous case, the volume produced has accordingly been the most important influence on internal agricultural incomes. In countries of this type, the balance of payments shows great fluctuations, because compensatory movements in imports are muffled by the stabilization of internal incomes, and there are correspondingly violent movements in the surpluses of the marketing boards. The first question to ask is what happens to these surpluses? In Burma they have mostly been paid into the general budget as 'rehabilitation' contri-

[1] The statistical framework for analysis, linking the sugar sector to other income accounts, is shown in the Barbados *Abstract of Statistics*, No. 2, 1958. (Statistical Service, Bridgetown.)

butions, which means that they have been in effect a very sharply progressive export duty, and their movements are reflected in government current and capital expenditures. In Ghana the mechanism of distribution of export incomes was radically changed in 1951. Up to then large surpluses were received by the Cocoa Marketing Board, where they were effectively blocked, because the Board could only spend them for a limited number of purposes. Since 1951, however, a sharply progressive export duty has been imposed and this has absorbed most of the fluctuation in exports attributable to price.[1] This heavy duty has enabled the government to increase its current and capital expenditures much more rapidly than other revenues would have permitted, and yet to continue to add to sterling reserves, even when cocoa prices (and the yield of duties) fell sharply in 1955. In the case of these two countries, economic analysis starts with the functions, policies, and accounts of the Boards, and continues with government fiscal operations. In both cases, however, difficulties of transportation and racial diversity are further complications, of which account must be taken, if economic policies and the roles of the marketing boards are to be understood.[2] The fluctuations in the leading exports in such an economy, and the 'cushioning' effect of Board and fiscal operations is illustrated by the statistics in Table VI. Compare the stability of all series in an economy where export prices are stabilized, like Barbados, with Table VI which shows how in a 'marketing board economy' there is a great contrast between stable internal economic series and fluctuating external ones.

Peasant monocultures. Lastly come the monocultures where there are no special institutional features of this sort, and the main exporting sector is broken up amongst a number of producers, too small for their individual policies to be taken into account. The leading cases here are Thailand (rice), Ceylon (tea), and Colombia (coffee), though tourist economies (such as Bermuda and the Bahamas) are not dissimilar from an analytical point of view.[3] These economies respond fairly freely to changes in exports, and can for some purposes be treated by aggregative methods of analysis, although it is always necessary to pay special attention to the leading product.

[1] The export duty is now effectively the price stabilizer, in the sense that the Board's power to alter the buying price has been greatly reduced. The State Agricultural Marketing Board in Burma has also been subject to a statutory profits tax since 1953.

[2] Cf., however, the treatment in 'Fluctuations in the Incomes of Primary Producers' (*Economic Journal*, Dec. 1952) by Bauer and Paish, where not only the analysis, but also the prescription, ignored such structural factors, being based on a rather mechanical use of a formula to determine prices.

[3] This refers to the position of Thailand since early 1955. Previously the Rice Bureau had bought and sold all rice exports. Foreign trade in rice was fully liberalized in the course of 1955, a fixed export duty being charged. In Ceylon part of the fluctuation in world tea prices has been absorbed by changes in the export duty, and this country has at times behaved in some respects like a marketing-board monoculture. In Colombia the Coffee Federation sometimes supports external and internal prices by buying coffee itself for inventory: this then changes the economy into a special type.

So far there has been little doubt whether the conventional economic and statistical techniques of short-period analysis can be used. The answer is fairly clear 'yes' for the leading industrial economies of North America and Western Europe, and fairly obviously 'no' for most economies dominated by a single mineral or agricultural product. We now enter a twilight

TABLE VI

A Marketing Board Monoculture: Ghana, 1952–5

(£ million)

	1952	*1953*	*1954*	*1955*
Cocoa statistics:				
Exports of cocoa (f.o.b.)	53	56	85	65
Cocoa Marketing Board surplus*	4	6	9	4
Government cocoa export duties	16	16	43	29
Incomes of cocoa farmers and brokers	34	31	30	34
Other statistics:				
Other exports (f.o.b.)	32	32	29	30
Merchandise imports (c.i.f.)	61	69	66	82
Company profits	15	16	15	15
Other central government revenue	24	26	27	28
Central government current expenditure	23	24	28	32
Fixed capital formation	26	29	32	35
Personal consumption	167	170	167	182
Net balance of payments on current account†	8	3	34	4
Sterling balances (end-year):				
Total	148	161	201	215
Central government	35	39	76	84

Source: Economic Survey, 1955 (Ministry of Finance, Accra).

* Includes small amounts from other public boards.

† Including Currency Board reserves.

area where it is not self-evident what sort of lines of inquiry should be pursued, because the economies are too complex to be represented as machines driven by a single commodity, but not diverse enough to be handled like an industrial economy.

(ii) *Primary Producers with a Number of Important Export Industries*

Where the industries are similarly organized. There are, however, a number of economies which are highly dependent on only two or three leading exports, rather similarly organized. Such economies can then be treated like the corresponding monocultures, both (or all three) exports being handled together, for simplicity of analysis. In Chile, for example, there was a period, up to 1950, when nitrates and copper were both responsible for substantial earnings of foreign exchange. The two industries were

both largely foreign-owned, and both heavily taxed in the same manner (largely by being forced to purchase pesos at an artificial exchange rate), so that one could treat the economy virtually as if it were producing one major mineral—using 'total minerals' as a category of analysis. (Copper became in recent years so much more important, relatively, that developments in nitrates ceased to be economically significant, and the economy became a simpler type, a single-mineral economy; see above.) In British Guiana the prices of sugar and rice exports are stabilized under Commonwealth and Caribbean agreements respectively,[1] and the export price of bauxite, though only nominal, can be considered stable.[2] The economy operates therefore in a manner not very different from a sugar monoculture. Similarly, in Uganda, both cotton and coffee are exported by marketing boards, and one could treat both these exports as a single category for analysis.[3] In the case of Nigeria, income analysis would presumably be more usefully conducted at the regional than at the national level, because of the economic isolation of the regions, and because much of the fiscal power is decentralized. But for some purposes, national analysis might be worthwhile, and one could then work with an aggregate marketing board sector (covering cocoa, palm oil, groundnuts, and cotton), for which one would need a separate statistical account.

Where the industries are few and differently organized. If the two or three leading industries differ greatly in structure, however, they must be treated separately, even in the most superficial analysis. This applies to the case of Malaya (tin and rubber) discussed above, as well as to Indonesia (rubber and petroleum), Guatemala (bananas and coffee), and the Leeward Islands (sugar and cotton).

Where the industries are several and differently organized. If there are more than three leading exports, one may have to group them together at certain stages of economic analysis, even though each commodity generates income in a different manner. Such an economy is Jamaica (exporting *inter alia*, bauxite, bananas, sugar, rum, and tourism) or Peru (exporting *inter alia*, cotton, sugar, lead, and petroleum). One might, for many purposes, be able to work with aggregative export and national product statistics, using only a supplementary analysis (covering some points) by commodity. A possible compromise, however, that would help a research

[1] The British Caribbean rice agreement is frequently re-negotiated, but in fact there is a certain stability in the price.

[2] Bauxite is an interesting commodity from an analytical point of view, because nearly all of it is mined by aluminium producers, and there is no world market for it. However, the local incomes it generates are usually stable.

[3] Marketing board commodities are handled as a separate economic category in an interesting study by A. Hazlewood, 'Trade Balances and Statutory Marketing in Primary Export Economies' (*Economic Journal*, Mar. 1957)—though the analysis there is rather longer period than is being considered in this paper.

economist grasp the working of an economy, would be to start by grouping the leading exports together into a category of 'major exports', and then to prepare a structure of national accounts as if it were in fact a monoculture producing a single crop called 'major exports'.[1] One has to tailor the categories used to suit the economy concerned, and the problems being studied. In New Zealand, for example, marketing boards stabilize personal incomes in most of the leading export industries (butter, meat, &c.) but not in wool; so the 'marketing board sector' would be a useful category for economic analysis,[2] supplemented by a separate table for the wool sector.

(*c*) Mixed Economies

Lastly, there are a number of large economies with quite highly developed local manufacturing industries, and relatively smaller, but still strategically important, exports of primary products. These include such major countries as Argentina, Australia, Brazil, India, Mexico, and South Africa.

There is no space here to examine these economies, each of which (especially India) is important enough and sufficiently atypical to require a paper of its own. All one can say is that in each case the range of industries, and the importance of autonomous factors, make it useful, and indeed inevitable, to use national income analysis for many purposes. But in all these countries, transport difficulties and exchange restrictions[3] impose structural limitations on the operation of economic forces, and these require special attention.[4] Moreover, in at least three cases, special attention also has to be devoted to one of the export industries—Australia (wool), Brazil (coffee), and South Africa (gold)—because of its economic significance.

We have now, in fact, reached, from the other end, the smaller industrial economies with important—but not quite so significant—primary exports, such as Canada, which have been discussed earlier, and which indeed might well be placed in the same category.

III. Some Implications for Short-period Compensatory Policy

We have completed a rapid survey of economies, ranged according to the applicability of conventional analysis. Clearly, one has to approach many of them with an open mind, prepared to follow either commodity analysis

[1] See *Size, Structure and Growth of the Economy of Jamaica*, Alfred P. Thorne (U.C.W.I., 1955). Bauxite is now, however, gaining such a dominant position in Jamaican exports that Jamaica may soon be better classified as a single-mineral economy.

[2] During the boom of 1950–1, the government also effectively blocked part of the wool proceeds by paying them into special accounts. It was then, temporarily, rather like a 'marketing board economy'.

[3] Except Mexico, which operates with freedom of exchange, but experiences periodic devaluation.

[4] In India and South Africa one would also have to take account of racial differences which create quite distinct consumer markets.

(until it becomes too complex) or aggregative analysis (until it becomes sterile). Sometimes, as in some of the countries mentioned towards the end, it may be necessary to weave the two approaches together.

Up to now, I have been discussing the problem of analysis as such, without discussing the purpose of carrying out the analysis. There are many possible reasons for trying to find out how the economy responds to short-period stimuli: moreover the question of purpose leads at once into the controversial field of policy. There is, however, one practical application which must be mentioned briefly, because it is important, and because it is a topic which follows logically those discussed above. This is the question of how adequately a government can stimulate the economy to offset a recession.

A critical difference in policy formation arises here between industrial and primary-producing economies, for one can assume a degree of short-run supply elasticity in industrial economies, especially the United States, which is lacking in primary producers. The possibility of compensatory action depends very much on the factors which have been investigated in this paper, particularly on diversification, on the size of foreign exchange reserves, on the extent to which the economy relies on imports, and on the capacity of the transport system. It is harder for the government of the United Kingdom (with its less flexible economic system, its limited foreign exchange reserves, and its greater dependence on imports) to take compensatory action than for the United States. It is somewhat harder again for Canada or Sweden, and harder still for the last group of mixed economies, to force local production up in the face of a world slump. The higher the propensity to import, the greater is the strain caused by a compensatory policy on the administration of import controls, if a foreign exchange has to be conserved,[1] and the heavier is the pressure on local capacity of the extra buying power, prevented from finding an outlet in purchases of imports. This means in turn the greater the danger of an internal price inflation, if supply is inelastic, for example because of limitations, of whatever nature, on food supplies, or because there are shortages of suitable capital or labour. When we come on to the more specialized agricultural and mineral economies, compensatory policies become very difficult to operate.[2] For the oil sheikhdoms they are virtually impossible.[3]

[1] In discussions of the possibilities of compensatory action in the United Kingdom in the 1930's some writers have overlooked the fact that very few people were ready then to approve of the import and exchange controls that would have been needed.

[2] On the other hand, if the commodity is adequately protected, as is the case for the Commonwealth sugar islands, such policies are very much less necessary.

[3] Although such a small fraction of the value of output becomes personal income that an overseas slump may not greatly affect the economy, provided overseas reserves permit the sheikh's personal outlays, government expenditure, and capital investment to be maintained. (The stability of a 'marketing board economy' also depends largely on the size of reserves.)

This brings out one striking difference between industrial economies and many primary-producers. A decline in exports in an industrial country reduces incomes and tends to induce a recession. A primary-producing country, however, which is short of foreign exchange reserves, has to reduce imports *pro tanto*. Now the decline in exports usually means, depending on the commodity concerned, a considerable reduction in Government revenue (apart from the possibility that the Government may also take special measures to protect peasant incomes by buying commodities for stocks, or by raising subsidies or reducing taxes),[1] and perhaps a fall in undistributed profits too. So the decline in personal incomes is often much smaller than the original decline in exports. However, the reduction in imports may well be concentrated by exchange controls onto consumer goods (including materials needed for making consumer goods), so the net effect may be to reduce supply more than demand in the market for consumer goods. Moreover, local suppliers cannot fully substitute for the missing imports, so certain goods become very scarce and their prices rise sharply: this leads to wage demands, especially to demands for Government action to raise minimum wages, and thus to general increases in all prices and devaluation of the currency. This mechanism, or something similar—leading to a price inflation at the same time as exports are falling and unemployment is growing—could be seen in several Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia and Uruguay) in recent years.[2] It is then highly dangerous to apply general expansionist measures, even though there is unemployment in industries producing exports and also, perhaps, in those using imported materials. On the other hand, general disinflationary policies, such as restrictions on banking credit, may lead to unemployment even in industries using local materials (especially construction) without appreciably relieving demand on overloaded sectors, or reducing *political* pressures for higher wages and salaries.

Stabilization policy can never, therefore, in primary producing economies, be based on a simple rule of thumb, such as filling by some fiscal means a certain estimated 'gap'. The sort of income-flows research described above can guide the policy-maker, but there is always a margin for qualitative judgement on the capacity of the government to control foreign exchange movements and on the extent of various supply elasticities (although the margin of uncertainty can be narrowed as the working of the economy becomes better understood). Moreover, policies need to be directly primarily towards easing specific inelasticities.

[1] This may, as in Brazil, take the form of eliminating an implicit tax, by adjusting the exchange rate for coffee exports (apart from official inventory building).

[2] Conversely, a rise in exports may allow both unemployment to be reduced and the price inflation to slow down.

A reasonable reaction of the reader would be that all this is obvious. So it certainly seems to be. But this is one of the cases where people who will not deny an argument continue to act as if it were untrue (like continuing to smoke tobacco in spite of the risk of cancer). The 'demonstration effect' of industrial countries is so strong (as in many other ways) that it is the rule, rather than the exception, for statisticians working in primary-producing countries to treat national income estimates as the highest priority in statistical work. It is also quite common for economists to attempt to apply 'Keynesian' analysis, and for politicians to believe that a recession in foreign trade, or a rapid price inflation, can be offset, without great difficulty, by suitable financial policies.[1] (In honesty I should add that when I was first working in these areas I fell into these errors myself, and it took many years before I fully grasped how far-reaching an adjustment was necessary.) It therefore seemed worth-while to set out at some length the fundamental reasons why a shift in approach is necessary, and to indicate what sort of a shift is needed for various economies.

ECONOMIC COMMISSION FOR LATIN AMERICA.

[1] These errors tend to be encouraged by most writers and teachers in industrial economies, because they fail to specify what sort of economy they are discussing and leave the impression, inadvertently, that their remarks are universally applicable. What is even more dangerous is the transfer to primary-producing countries of a preference for or against Government control as counter-cyclical policy instruments, when this preference is based upon (usually unconscious) assumptions about economic and social institutions, which are valid (if at all) only for industrial economies.

THE BEARING OF NON-COMPETITIVE MARKET CONDITIONS ON THE PROBLEM OF INFLATION

By J. MARCUS FLEMING

Introduction and Summary

In recent years there has been an increasing tendency in economic writing to distinguish between 'demand-induced' and 'cost-induced' (or 'wage-induced') inflation, and to emphasize the role of 'cost-push' as against 'demand pull' in imparting an upward trend to the movement of general prices.

It is true that the prices of most industrial products are largely determined by their costs of production and that any rapid increase in product prices is likely to be associated with a rise in factor costs. This, however, provides no reason to alter the traditional treatment of inflation as a demand-supply phenomenon so long as factor prices, including wages, are themselves determined by supply and (derived) demand on competitive markets. If there is a case for distinguishing any new category of inflation it must rest on the fact that in reality prices of factors and products seldom are determined on perfectly competitive markets.

The present paper therefore examines the effects which non-competitive pricing of factors and products may have on the rate of growth of the price of final output and on the appropriateness of policies aiming at price stability. The treatment is analytical and can therefore throw but limited light on the strength of the forces at play in any actual instance of inflation, but may serve to suggest which relationships it would be most useful, if practicable, to establish and quantify by empirical investigation.

For simplicity, the analysis is conducted in terms of a closed economy.

After certain aspects of the inflationary process, as it would develop under conditions of perfect competition, have been described, it is shown that departures from competitive pricing occurring in the course of inflation are mainly due to the interaction of (*a*) monopolistic restriction of supply, (*b*) 'stickiness' in money wages and prices, and (*c*) attempts to maintain stable relationships between prices of different sorts.

A distinction is drawn between 'underpricing' and 'overpricing'—both being defined in relation to the competitive price of the item in question. The effects on the price of final output of changes in the degree of overpricing or underpricing of labour and of various categories of products respectively are then analysed on the assumption of a given supply of money. While in most cases reduction in underpricing and increase in

overpricing are found to increase the velocity of circulation and to raise the price level of final output, the degree and mechanism of the inflationary effect will differ for reduced underpricing and increased overpricing respectively, and for wages and other prices respectively.

On the basis of this static analysis a dynamic model of inflation is then described in which provision is made for the influence on price change of (*a*) the (limited) responsiveness of wages and prices to demand pressures, (*b*) the adjustment of prices to costs, and (*c*) the (lagged) influence of cost of living on wage-rates. The inflationary effects of changes in 'aggressiveness' on the part of labour and enterprise and of changes in the rate of expansion of the money supply are then explained in terms of the model. It is shown that whereas, except in extreme cases, the inflationary effects of attempts to secure higher real rewards will be of a temporary character, the rate of monetary expansion will in the end determine the rate of price inflation.

Changes in the rate of monetary expansion are shown to affect the level of output and the rate of development, but whereas in the case of 'creeping' inflation these effects may be permanent, in the case of stronger inflation they are likely to be of a temporary though not a reversible character.

The policy implications of non-competitive pricing are then considered and it is shown that financial disinflation and anti-monopolistic action are not alternative but complementary policies; the application of either makes the other not less but more desirable.

Finally, the bearing of the analysis on the classification of inflations is considered and a distinction is drawn between 'cost-determined' and 'cost-induced' inflation.

The Inflationary Process Under Perfect Competition

In an economy where prices, of products and factors alike, move flexibly in response to demand and supply on competitive markets, labour will be fully employed and productive facilities will be utilized to their full economic capacity. In these circumstances, if product prices in general are rising this is best attributed to the fact that the flow of total money demand is rising faster than the total supply of goods and services, as determined by changes in the working population, in the stock of capital, and in productivity.[1,2]

[1] In an 'open' economy changes in the terms of international trade would have to be added to this list.

[2] Inflation of the type described above is sometimes attributed to a persistent excess of aggregate real demand in some sense, over the potential supply of goods and services. This appears to imply that the course of inflation is marked either by a continuous shortage of finished goods or by a continuous excess of expected over realized purchasing power.

The growth in monetary demand may conveniently be regarded as determined, in the first instance, by (*a*) the growth in the stock of money, and (*b*) changes in the velocity with which the stock of money circulates.

These in turn are influenced by more ultimate factors. Velocity in particular is likely to be influenced by any important changes in real economic relationships. For example, if the marginal 'efficiency' or profitability of new investment should increase, whether because of technical developments, or because savings are too low to enable the growth in the capital stock to keep pace with the growth in the working population, the consequential increase in interest rates will operate to raise the rate of turnover of the money stock and the level of money demand.[1]

Some of these underlying factors act on supply as well as on demand. For example, an intensification in the rate of improvement of productive technique will promote inflation in so far as it raises the profitability of new investment and thus provokes an increase in the velocity of circulation but it will also damp down inflation in so far as it accelerates the rate of growth of output. Very probably, the initial effect of such a development will be inflationary, the ultimate effect disinflationary.

Factors of the type discussed above, however, are unlikely to bring about a rapid and continued increase in the real marginal productivity of capital and hence, apart from their effect on price anticipations, are unlikely to occasion any rapid and long continued rise in the velocity of circulation and in prices. On the other hand any acceleration in the rate of increase of prices that lasts long enough to evoke an acceleration in the *anticipated* rate of price increase will raise the profitability of investment in money terms and hence promote an increase in the velocity of circulation. A pure speculative inflation based on velocity, however, cannot long continue on its own momentum. As soon as prices and velocity cease to rise faster and faster they must begin to fall, and a series of fluctuations will ensue.

It seems clear, therefore, that continuous inflation is only possible if the monetary authorities permit a corresponding expansion in the supply of money. A limited rise in the real marginal productivity of capital will lead to a fluctuation in velocity of circulation eventuating in a limited once-for-all increase in velocity. An increased rate of expansion in the money stock will also lead to velocity fluctuations eventuating in a once-for-all increase in velocity[2] but after the movements in velocity have died down the rate

The former assumption is incompatible with perfect competition; the latter seems unwarranted by the facts.

[1] Savings also may increase but, *ex hypothesi*, not sufficiently to prevent the rise in interest rates and increase in velocity.

[2] The once-for-all increase in velocity results from the rise in profit rates and interest rates associated with the permanently enhanced rate of price inflation.

of price expansion will have risen *pari passu* with the rate of expansion in the money stock.

The various factors that affect the velocity of circulation also affect to some extent the size of the money stock, particularly the part that consists of bank deposits. They do not, however, operate unambiguously in the sense of expansion or contraction. Thus a rise in profit and interest rates, by raising the velocity of circulation of bank money more than of cash, will induce the public to draw cash out of the banks, thus tending to force the latter to contract the supply of bank money: on the other hand the same increase in profits and interest will tend to sustain the supply of bank money by inducing the banks to tolerate a lower ratio of reserves to liquid liabilities.

For this reason and in order to avoid considering the repercussions of balance-of-payments developments on the supply of money, it seems best to regard the latter as determined by official policy. Included among the reasons that may motivate governments to permit an excessive expansion of money stock are a desire to maintain a higher real budget deficit than would otherwise be possible, a desire to keep interest rates, especially those paid on public debt, artificially low, and a desire to reduce the real capital value of the national debt.

The most respectable argument for inflationary financial policies is the possibility of utilizing the mechanism of 'forced savings' to raise the total level of national savings and investment above what would otherwise be possible. Under competitive conditions, however, the only forced savings that arise in the private sector are those resulting from time-lags between the earning and the receipt of income and between the receipt and the expenditure of income. Owing to these lags private expenditure on consumption will be related to the income of a previous period and, when prices and incomes are rising, this will artificially reduce the proportion of current income that is currently consumed and increase the proportion that is saved. This type of forced saving is unlikely to persist after people have come to realize that they have for some time been consuming less than corresponded to their true level of real income.

As for the public sector, in countries where indirect taxes are of an *ad valorem* type and direct taxes are progressive while national debt interest and other money transfers constitute a large part of budgetary expenditures, inflation is likely to result for a time in an increase in public savings. This type of forced saving also is likely to dwindle or disappear as political influence gets to work to enforce an increase in public expenditure or reduction in taxation.

The evil effects of inflation in causing a maldistribution of investment, in disrupting the credit system, and in bringing about a violent transfer of

wealth and income from creditors to debtors, and transfer of income from pensioners to taxpayers, are well known. Where such inflation occurs in a fully competitive market economy, it can and indubitably should be brought to an end by curtailing the rise in the flow of monetary demand; in the circumstances assumed a disinflationary financial policy could be put into effect without reducing employment or output, and with little, if any, permanent detriment to real investment.

Conditions Responsible for Non-Competitive Pricing

Very few goods and services are priced on perfectly competitive markets. An item may be said to be 'overpriced' or 'underpriced' according to the relation of its actual price to the price it would have if its own market were perfectly competitive but prices and conditions on markets for other items were what they actually are.

Departures from competitive pricing usually arise in one of the following three sets of circumstances: (1) combination among sellers, (2) the existence of firms sufficiently large relative to the (possibly specialized or localized) markets on which they sell to be able to influence price, and (3) government price control.

In the circumstances described under heads (1) and (2) it is natural that prices should tend to move towards levels somewhat in excess of the competitive norms. Thus wages will tend towards target levels in which a certain amount of unemployment prevails and product prices towards target levels at which there is a certain degree of underproduction.[1] However, there are a number of reasons why prices which are determined on imperfectly competitive markets do not move in such a way as to maintain a constant degree of unemployment or underproduction.

In the first place there is a tendency for imperfectly competitive prices, when expressed in money terms, to move only slowly, or only after a lapse of time, in response to the various pressures and motives to which they are subject. Such inertia or 'stickiness' is notable with respect to wages and salaries, rents, and the prices of public utility and transport services and of such manufactures as are produced by industries in which cartelization or concentration exists. Most of these prices, especially wages, show a greater resistance to downward than to upward movements, but when inflation is in its early stages or is gathering speed, wages and 'administered' prices are likely to lag behind the general rise, thus becoming increasingly underpriced, or at least less overpriced than they would otherwise have been. This 'stickiness' arises from the slowness with which

[1] There is also likely to be under-utilization of productive capacity but where a manopolistically inclined industry can control the entry of new firms under-utilization of capacity may largely be replaced by under-investment in new capacity.

labour contracts are re-negotiated, from a tendency to think in terms of money rather than real rewards, and from a desire not to disturb customer relationships by too frequent changes in prices.

There are other influences affecting price formation which may tend to alter the degree of underpricing or overpricing of certain items. For example, there is probably a tendency for wages of more than the 'target' degree of scarcity to rise faster and faster the longer that scarcity is maintained. More important and better established are (*a*) the tendency to adjust wages, with a longer or shorter time-lag, to compensate for changes in the cost of living, (*b*) the tendency to maintain customary relativities between the wages earned in different occupations, (*c*) the tendency to maintain proportionality between the prices of manufactured goods and their variable unit costs, and (*d*) the tendency to maintain a more or less fixed relationship between farm prices and the prices the farmer pays for industrial goods.

Tendency (*a*) comes increasingly into operation as inflation proceeds. Its effect, as we shall see, is to reduce any underpricing of labour which may have arisen from the sluggishness previously discussed, and possibly to promote overpricing. Tendency (*b*) also has the effect of reducing underpricing and promoting overpricing of labour by extending to other types of labour the wage advances granted to those types for which the pressure of demand on supply is greatest. Tendency (*c*) may operate, as we shall see, according to circumstances in the direction of promoting overpricing or underpricing. Tendency (*d*), which depends, as a rule, on the action of the state, is frequently inoperative at early stages of inflation when farm prices are in any case above parity, but may operate to promote overpricing at a time when attempts are being made to restore price stability.

The manner in which these various mechanisms, acting in conjunction with demand pressures, operate on prices can be shown only by the construction of a model such as is discussed in a later section of this paper.

Effects of Changes in Underpricing

The two following sections contain an analysis of the effects on the price level of final output of once-for-all changes in the degree of underpricing or overpricing of labour and of various categories of products respectively, on the assumption that the supply of money is given. Alternative assumptions are made regarding the price flexibility of items other than those whose prices are initially affected by the changes under examination. These changes should be thought of as superimposed on a general upward movement of prices and money supply, and when particular prices are said, for short, to be 'reduced', 'increased', or 'held constant' this must be understood not in an absolute sense but relative to the price

trend that would otherwise have prevailed. The purpose of this static analysis is to facilitate the understanding of dynamic models—not only that discussed in a later section, but any other which the reader may construct for himself.

Let us first consider the effects of increases in underpricing such as will occur during the early phases of an inflation when prices of certain factors and products lag behind the rise in their competitive market values.

Underpricing of any type of labour or product will usually be associated with a shortage, i.e. an excess of demand over supply, in that type of labour or product.[1] The fixing of an artificially low profit margin at any stage of production is likely to lead to underpricing of the product.

Any reduction in wages involving emergence of or increase in labour shortage is likely to reduce the price level of final output, even if all prices other than wages are freely determined on competitive markets. This is not due to any increase in output—which if anything is likely to be adversely affected by the diseconomies resulting from 'hoarding' of labour and its misallocation—but rather to a reduction in the velocity of circulation and hence in monetary demand. The increased underpricing of labour will involve a transfer of income from workers to employers, hence from low savers to high savers, which will enhance the aggregate propensity to save and reduce the propensity to consume. While the profitability of existing capital will be increased that of new investment is unlikely to be affected.[2] The transfer of income to entrepreneurs will facilitate direct investment and may increase the amount of investment that will be undertaken at a given interest rate but this increase is unlikely fully to offset the decline in consumption by workers. The net effect of lowering wages will thus probably be to make interest rates, velocity of circulation, level of monetary demand, and price level of final output all lower than they would otherwise have been. The reduction in the price level, however, will be proportionately far less than the reduction in wage rates.[3]

We have been assuming product prices to be competitively determined. If labour is in short supply products cannot be overpriced,[4] but they can

[1] In exceptional cases of underpricing, particularly in public utilities, output may be held at a level sufficient to satisfy the entire, artificially enhanced, demand even though marginal output has to be produced at a loss. This case is not further considered in the present paper.

[2] The technical possibilities for substituting capital for labour and the marginal productivity of labour remain the same as before. Assuming no change in the relative prices of investment goods and other goods the relationship between the cost of additional investment goods and the value of the product of labour saved will thus remain unchanged.

[3] The decline in money demand necessary to bring about a fall in the price level proportionate to that in wages is greater than the decline in payrolls. And the actual decline in demand will be considerably less than the decline in payrolls since (*a*) part of the income transferred from the workers will be spent on consumption and direct investment by entrepreneurs, and (*b*) the decline in interest rates will stimulate investment.

[4] To raise the price of products above the competitive price would reduce demand and

be underpriced. If the products at the final stage in production are underpriced (i.e. in short supply) and unaffected by wage movements a fall in wages will somewhat reduce demand for, and shortage of, the products in question. In the more probable event that product prices are determined by profit margins that are somewhat inflexible in absolute or percentage terms, a fall in wages will automatically be transmitted to the prices of intermediate and finished products and will increase the shortage (underpricing) of these products rather than of labour itself.

Consider now the effect of increased underpricing of particular products, assuming wages and the prices of other products to be competitively determined.

A reduction in the price of intermediate goods[1] involving an increased shortage of such goods will have effects similar to those of a reduction in the price of labour in short supply. Since, however, the transfer of income will be, not from workers in general to employers in general, but from workers and employers in the earlier stages of production to employers at the later stages, the effect of a given transfer in damping down aggregate demand and reducing the price of final output will be even smaller.

A reduction in the price of finished goods in short supply will have little if any effect on income distribution. However, there will be incentive effects on the inducement to invest and propensity to consume, tending to reduce the flow of monetary demand.

If the price of all investment goods is reduced the demand for and price of consumption goods will decline through the action of the Keynesian 'multiplier' to almost the same extent as those of investment goods.

Again, if the prices of all consumer goods are reduced, investment goods prices will tend to decline as well, though to a lesser extent than the prices of consumer goods. The reduction in consumer prices and incomes will reduce quasi-rents and hence the profit on new investment, and, were interest rates constant, investment goods prices would be reduced in proportion. But the decline in incomes relative to the holding of money balances will bring down interest rates and mitigate the reduction in investment expenditure.

If a certain proportion of final output consists of commodities whose prices are competitively determined and which therefore do not participate in the increase in underpricing, its effect on the value of output will be reduced by more than this proportion since at least a part of the expenditure saved on the underpriced goods will be diverted to those that remain subject to competitive pricing.

output and, with fixed technical coefficients, reduce employment. But if there is unemployment there cannot be shortage of labour.

[1] i.e. materials, semi-manufactures, and even manufactures before the stage of sale to consumers or investors.

A reduction in price confined to particular classes of investment goods in short supply is fairly certain to lead to *some* net reduction in investment expenditure and, hence, through the action of the 'multiplier', in consumption expenditure also. Since expenditure on investment goods in short supply will be reduced by the reduction in their price, overall investment expenditure could only be maintained if expenditure on those investment goods that are competitively priced were to increase to a corresponding extent. This, however, would drive up the prices of the latter and thus reduce the marginal profit rate to be earned through investing in their purchase. To maintain the level of investment expenditure in the face of this decline in the profit rate it would be necessary to reduce interest rates. This, however, would entail a decline in the velocity of circulation that is incompatible with the maintenance of investment—and total—expenditure. Investment expenditure must therefore, on balance, be reduced.

An increase in underpricing confined to particular types of consumer goods, on the other hand, is much less likely to effect a significant net decline in expenditure. True, the transfer of expenditure from underpriced consumer goods to those subject to competitive pricing will force up the price of, and reduce the marginal utility of money expenditure on, the latter. But only if, and to the extent that, the reduction in marginal utility of expenditure is expected to be temporary will there be any tendency for total consumption expenditure to decline and only if consumption expenditure is reduced will velocity of circulation, total expenditure, and prices in general fall below what they would otherwise have been.

It has been assumed, thus far, that labour is subject to competitive pricing and that wages will decline[1] *pari passu* with finished goods prices in order to maintain full employment. If, as is in the short run more probable, money wages are unaffected by the decline in product prices, any reduction in price of finished goods will reduce profits and increase the propensity to consume. This will make still smaller the decline in aggregate consumer expenditure associated with any given reduction in price of underpriced finished goods.

The foregoing analysis has run in terms of increases in underpricing. Decreases in underpricing, such as occur in the later stages of inflation, have the opposite results. Increases (relative to trend) in the wages paid to labour in short supply, and to a lesser extent increases in the prices of intermediate products in short supply, lead to inflationary changes in the distribution of income; increases in the prices of investment goods in short

[1] The reader may be reminded that this 'decline' is conceived not absolutely but relative to the trend that wages would have followed in the absence of the change in underpricing.

supply to increases in the value of investment relative to output; and increases in the prices of consumer goods in short supply to increases (probably slight) in the propensity to consume.

Effects of Changes in Overpricing

Overpricing of any type of labour will usually be associated with unemployment or short time in the occupation in question, but it may also find expression in abnormally low labour productivity or in a diversion of labour to less productive occupations. Overpricing of products may sometimes find expression in the piling up of abnormally high inventories but is more usually associated with restriction of output and an uneconomically low utilization of productive equipment, i.e. a level of output at which price exceeds marginal cost.

The consequences of changes in overpricing are not closely analogous to those of changes in underpricing. When, in the earlier stages of inflation, decreases in overpricing are succeeded by increases in underpricing a fundamental alteration takes place in the inflationary mechanism, and the same is true in the later stages of inflation when decreases in underpricing are followed by increases in overpricing. Whereas changes in underpricing predominantly affect money demand, changes in overpricing affect supply as well as demand.

Consider, first, the effects of an increase in wages, involving an increase in the overpricing of labour, on the assumption that all other factors and products are priced on competitive markets. Let us ignore, for the time being, any effect on the flow of monetary demand. Even in those conditions the rise in wages will tend to raise the price of finished products by provoking a decline both in the employment of labour and in the volume of production—a mechanism that is absent in the case of a reduction in the underpricing of labour. Another way of putting this is to say that finished goods prices will rise on account of a rise in costs quite apart from any increase in monetary demand.

Since the marginal productivity of labour will increase as employment declines, the rise in finished goods prices, under competitive conditions, will be proportionately less than that of wage rates. Whether finished goods prices will increase or decline relative to wage costs, and whether in consequence the share of wages in the national income will fall or rise, will depend on whether the elasticity of substitution between hired labour and all other factors taken together is above or below unity. In the short run the elasticity of substitution between hired labour and other factors is probably less than unity especially in the vicinity of full employment.

Thus far it has been assumed that the magnitude of the flow of money

demand will be unaffected by the rise in wages. In fact demand is almost, though not quite, certain to increase even if the rise in prices is not allowed to evoke any increase in the supply of money.

As employment, output, and real income decline there will be an increase in the ratio of consumption to income, for three reasons: (*a*) The proportion of his income that the average individual consumes probably increases as his real income declines. (*b*) The increase in the share of wages in the national income which, as we have seen, is likely to take place, will tend to raise consumption. This, however, is not likely to be very important since the decline in the share of non-wage incomes is likely to fall not so much on the firms employing wage labour as on landholders and agriculturists, whose marginal propensity to consume may be little lower than that of wage earners. (*c*) The rise in unemployment will involve increased net expenditures by social insurance funds or transfers to unemployed from taxpayers with a lower marginal propensity to consume.

On the other hand the fall in output and real income will tend, with interest rates and scarcity of money unchanged, to bring about a reduction in real investment. In the short run, however, investment plans are probably not very sensitive to variations in current output and profits and the tendency to a fall in real investment will probably not go so far as to involve a decline in the ratio of investment to income, still less a decline in that ratio great enough to offset the decline in the savings ratio.[1] It will therefore be necessary for interest rates—and money scarcity in general—to rise in order to curtail investment plans and such a rise will evoke an increase in the velocity of circulation and hence in the flow of money demand.

There can be little doubt but that a given proportionate rise in wages will effect a bigger increase in product prices if labour is initially overpriced than if it is initially underpriced. In the former case prices rise in response to changes in supply as well as in demand and if the demand effects are smaller in the former than in the latter case this is largely because the distributional changes are less marked, i.e. because prices *do* rise more nearly in proportion to wages, in the former than in the latter case.

The effects of increased overpricing of labour in raising the general price level for finished goods will be somewhat intensified when account is taken of the stickiness of certain non-wage elements in production costs. Profit margins in industry, in so far as they are not determined by competition, are likely to be fixed in percentage terms. This will prevent the share of

[1] If investment were more responsive than savings to changes in real output and income the economic system would be highly unstable since there would be no equilibrium level of output corresponding to a given rate of interest

profits in industrial income from declining as it would otherwise have done with reduced employment and will enhance both the rise in finished goods prices and the fall in employment and output that corresponds to a given rise in wages.

In certain sectors of industry prices might tend to rise even more than wages. For example, in cases where prices are determined on the 'full cost' principle, profit margins may be actually increased as output diminishes in order to preserve a given level of real profits. Or again—and this probably affects a wider range of industries—real labour costs per unit of output may increase as output declines, because of the importance of overhead costs, because workers seek to 'spread the work' as employment declines, or because employers hang on to labour that is not strictly necessary for production.

In other sectors of industry, imperfection of competition may actually moderate the price rise that would have been occasioned by a wage increase under competitive conditions. This will occur when price margins are 'sticky' in absolute rather than percentage terms, and *a fortiori* when firms are reluctant to alter the absolute level of product prices. In this case price margins will decline and wages will rise at the expense of profits. On balance we may conclude that the existence of imperfect competition in various sectors of industry may not greatly alter the overall picture of the effects of wage increases on product prices that has been drawn on the assumption of perfect competition.

More importance probably attaches to the fact that raw material prices may not be allowed to decline as they would probably tend to do under perfect competition when wages are increased and employment in industry is reduced, while attempts may be made to defend farm price parities by raising agricultural prices *pari passu* with industrial.

These reactions obviously tend to intensify the increase in finished goods prices corresponding to a given increase in wages, and hence to intensify the decline in output that will result from a given wage increase for any given level of money demand. They will probably also tend, on balance, to increase the flow of money demand.

A rise in profit margins involving increased overpricing of products, if applied in an environment in which wages are determined on competitive markets, is likely to *reduce* the prices of finished goods. Wages will decline in such a way as to prevent the emergence of unemployment, and the decline in the ratio of wages to national income will probably reduce consumption expenditure more than it will raise investment expenditure.[1]

[1] It is, however, not at all certain that raising profit margins, with labour competitively priced, will have a disinflationary effect—much less certain than that reducing wages of labour in short supply, with products competitively priced, will have such an effect. In the

Since output will be little affected, any significant fall in expenditure will be likely to involve a fall in the price of final output.

If, however, wage rates are 'sticky' in money terms the rise in profit margins is certain to bring about a rise in finished goods prices and, in the absence of any change in the flow of money demand, output and employment will decline. It is impossible in this case to say whether the velocity of circulation, and hence the flow of money demand, will rise or fall. In so far as the rise in profit margins is confined to industry, the decline in output will tend to induce a fall in raw material prices, and probably food prices, which will mitigate the rise in the price-level.

A rise in price, involving increased overpricing, of farm products will tend to raise the price-level of final output through the withholding of farm supplies quite apart from any increase in aggregate demand. If all other goods and services are supplied under competitive conditions their prices will probably fall,[1] thus mitigating the increase in the price-level of final output. If, however, wages and industrial prices are resistant to downward pressures the supply of industrial as well as of agricultural goods will probably decline and the price-level of final output will rise more than if wages had been flexible.

Since farmers have a rather high marginal propensity to spend (on consumption and farm investment) the transfer of real income from non-farmers to farmers may have little or no adverse effect on aggregate expenditure, while the reduction in overall real income will tend to raise consumption expenditure in money terms. Velocity of circulation and money expenditure may therefore increase, raising the price-level further. If the rise in farm prices is implemented, not by crop restriction, or destruction, but by the accumulation of surplus stocks, this will constitute a further, artificially induced, stimulus to investment. In the latter event it is uncertain whether there would be any net decline in industrial output and employment.

Inflation Model with Non-Competitive Pricing

It is useful to construct a simplified dynamic model in order to illustrate some of the possible interactions between demand and cost influences in the inflationary process under non-competitive conditions.

Suppose that wage changes are determined—after a time-lag required by the process of collective bargaining—by the scarcity of labour and by

latter case, as we have seen (p. 43), the increase in the inducement to invest will be small. In the former case it may be very substantial. Newly invested plant may be able to reap the advantage of the high profit margin by increasing the under-utilization of existing plant. This rise in the inducement to invest may even outweigh the fall in the propensity to consume.

[1] This assumes that the elasticity of substitution of farm products and industrial products is less than unity.

the trend in the cost of living, or price-level of final output. More specifically, let actual wage-rates at any time equal 'target' wage-rates at a previous time, the interval between the two times being referred to as the 'adjustment lag'. Then let the proportional rate of increase of target wage-rates consist of two elements, one of which varies positively with the scarcity of labour,[1] while the other is a fraction of the proportional rate of increase of the price-level of final output.

In this model the 'aggressiveness' of labour may be measured by the level which the first or 'scarcity' element in the rate of increase of target wages attains in a state of optimal labour scarcity, i.e. a state of 'full' but not 'overfull' employment. The flexibility or 'demand sensitivity' of wages will be indicated by the extent to which this element in the increase of target wages varies with variations in the degree of labour scarcity. The ratio formed by dividing the second or 'cost of living' element in the proportional rate of increase of target wages by the proportional rate of increase in the price-level of final output indicates the degree to which workers are compensated for changes in the cost of living. This 'compensation ratio' will normally be less than unity.

If finished products were competitively priced the ratio of the price-level of final output to the level of money wages would vary with the degree of labour scarcity, the variation being slight when unemployment prevails but sharp when labour is in short supply. In the present model, however, it is assumed that this 'price/wage ratio' will respond less strongly to changes in labour scarcity than under competitive conditions. At a 'normal' level of unemployment profit margins will be above competitive levels and products will be somewhat overpriced. At higher levels of unemployment product overpricing will be still greater, but when labour is in short supply some products will probably be in short supply also. To each degree of labour under- or overpricing will thus correspond to a given degree of under- or overpricing of products.

Now assuming a constant proportional rate of increase in the money stock, and a constant real productivity of investment, there will always be some equilibrium degree of labour scarcity at which both prices and wages rise at constant proportional rates.

In such an equilibrium position the proportional rate of increase of target wages will be equal to that of actual wages and equal to the sum of the proportional rates of increase of prices and of productivity respectively. If the compensation ratio were as high as unity the 'cost of living' element in the rate of increase of wage-rates would alone be equal to the rate of

[1] By 'scarcity' of labour is meant demand less supply. Scarcity may be positive or negative and is measured when positive by unfilled vacancies and when negative by unemployment or underemployment.

increase of prices, and labour scarcity would therefore have to be such as to make the first element in wage increase equal to the rate of productivity increase. But so long as compensation is only partial the cost of living element in wage increase will fall short of the rate of price increase, and the 'scarcity' element in wage increase must exceed the rate of growth of productivity if prices are to rise. The relationship between the different variables is set forth in the following formulae:

$$\frac{\dot{w}}{w} = \frac{\dot{w}_1}{w} + \frac{\dot{w}_2}{w} \tag{1}$$

when

$$\frac{\dot{w}_1}{w} = \frac{\dot{e}}{e} + \frac{\dot{p}}{p}(1-c) \tag{2}$$

and

$$\frac{\dot{w}_2}{w} = c\frac{\dot{p}}{p}, \tag{3}$$

where $\frac{\dot{w}_1}{w}$ stands for the first or 'scarcity' element, and $\frac{\dot{w}_2}{w}$ for the second or 'cost of living' element, in the proportional rate of wage increase, $\frac{\dot{e}}{e}$ for the proportional rate of increase in productivity, $\frac{\dot{p}}{p}$ for the proportional rate of increase in the price of final output, and c for the compensation ratio.

Now, since, in this equilibrium situation, the scarcity of labour and that of products are both constant, and since the anticipated profit rate is also constant[1] the velocity of circulation of money will be constant and the proportionate rate of price increase will be equal to the proportionate rate of increase of productivity. It follows that wages will rise at the same rate as the stock of money.[2] The various elements in the rate of wage increase will then be determined in accordance with the following formulae:

$$\frac{\dot{w}_1}{w} = c\frac{\dot{e}}{e} + \frac{\dot{m}}{m}(1-c) \tag{4}$$

and

$$\frac{\dot{w}_2}{w} = c\left(\frac{\dot{m}}{m} - \frac{\dot{e}}{e}\right), \tag{5}$$

where $\frac{\dot{m}}{m}$ stands for the proportional rate of increase of the money stock.

It will be observed from these equations that the equilibrium value of each of the elements of the rate of wage increase is determined irrespective of the aggressiveness of labour or the restrictiveness of enterprise. Thus, starting from such a position of dynamic equilibrium, if *an increase* takes place *in the 'aggressiveness' of labour*, so that wages tend to rise faster than

[1] This follows from the fact that the real productivity of investment and the anticipated rate of price increase are both constant.

[2] This abstracts from any increase in the size of the working population.

before, there will be a decline in the scarcity of labour until, at a new equilibrium position, wages are once again rising at the original rate.

The effects of the temporary acceleration of wage inflation can be deduced from what was said in previous sections about the effects of once-over wage increases.

The nature of the transition from the old equilibrium to the new will be somewhat different according as the compensation ratio is or is not negligible. If wages are insensitive to changes in the cost of living (i.e. if $c = 0$) the transition will be a relatively smooth one. There will be an acceleration in the expansion of monetary demand achieved through an increase in circulation velocity but, apart from any stimulus that may be given to the inducement to invest through anticipations of intensified inflation, the intensified expansion of money demand will not suffice to prevent some decline in labour scarcity. The inflation of prices will be intensified, though to a lesser extent than that of wages, i.e. profit margins will decline. If labour is initially underpriced and in short supply the stimulus to price inflation will be relatively slight, and will be applied predominantly from the side of demand; if labour is originally overpriced and partly unemployed the stimulus to price inflation will be about as great as the rise in wage inflation and will be largely applied from the side of cost.

As the scarcity of labour declines the rate of increase of wages will decline. The speed of wage inflation will go on falling till it reaches its initial level, corresponding to the rate of expansion of the money stock. The rate of price inflation will likewise fall to its initial level. At the new point of dynamic equilibrium labour scarcity, and possibly output, will be below their initial levels, as will be also the price-wage ratio; on the other hand, velocity of circulation will be somewhat higher than in the initial position.

The transition to the new equilibrium, however, will not be entirely straightforward. Owing to the adjustment lag of actual wages behind target wages, when labour scarcity has fallen to its new equilibrium level wages will still be rising at a rate appropriate to a somewhat higher level of labour scarcity, i.e. at a rate higher than the rate of monetary expansion of the money stock. This will force labour scarcity (and possibly output) temporarily below the new equilibrium levels. Labour scarcity and output will settle down at these equilibrium levels only after oscillating round them for a time.

The transitional inflation to which a given increase in labour aggressiveness gives rise will be more severe if wages are at least partially compensated for changes in the cost of living (i.e. if $c > 0$). The enhanced rate of price inflation resulting from the initial acceleration of wage inflation will then provoke a further intensification of wage inflation and so on in a spiral of rising wages and prices. Owing to the adjustment lag the transitional

inflation will take time to reach its maximum intensity. As the scarcity of labour declines, however, a point will be reached at which the deceleration of the 'scarcity' element in wage increase begins to outweigh the acceleration of the 'cost of living' element, and the intensity of wage and price inflation will diminish. Finally the original rate of wage and price inflation will be restored at a lower level of labour scarcity, but only after oscillations have taken place in labour scarcity (and possibly in employment and output) more severe than would have occurred in the absence of a link between wages and the cost of living.[1]

Whether or not such a link exists, inflation will be more intense during the transition period following a rise in labour aggressiveness than in either the initial or the new equilibrium position and this may bring about an increase in the anticipated rate of price inflation and hence in the anticipated rate of profits. In this event the transitional intensification of inflation may for a time result not in a decline but even in an increase in labour scarcity, which will further feed the inflation. Such speculative spurts in inflation, however, based as they are on the elasticity of velocity of circulation, contain, as we said on page 39, the seeds of their own reversal.

A decline in the rate of productivity growth will, of course, increase the rate of price inflation corresponding to any given rate of wage inflation. The equilibrium rate of wage inflation, being equal to the rate of expansion of the money stock, will not be affected by the change in productivity growth, and the equilibrium rate of price inflation will therefore increase. The rise in productivity growth will also affect the inducement to invest and propensity to consume in the ways indicated on page 39 above. Apart from the last-mentioned reactions, however, if there is any link between wages and the cost of living a decline in productivity growth will affect the equilibrium level of labour scarcity in the same way as, though to a lesser extent than, an increase in labour aggressiveness. By intensifying the price inflation it will raise the 'cost of living' element in wage increase and hence necessitate a corresponding decline in the 'scarcity' element. In addition to the 'permanent' increase in price inflation there will be a transitional intensification of inflation while the scarcity of labour is declining to its new equilibrium position.

An increase in the extent to which wages are compensated for changes in the cost of living will have the same sort of effect as an increase in labour aggressiveness or a decline in productivity growth in giving rise to a

[1] The greater severity of these oscillations round the new equilibrium position is accounted for (*a*) by the greater violence of the transitional intensification of inflation between the old and the new equilibrium, and (*b*) by the fact that actual wage growth at a given degree of labour scarcity lags by more than a single adjustment period behind the equilibrium rate of wage growth at that degree of scarcity.

transitional intensification of inflation on the way to a new and lower equilibrium level of labour scarcity.

In all three of the contingencies just examined—an increase in labour aggressiveness, a slowing down in productivity growth, and an increase in the compensation ratio—the extent of the decline in labour scarcity that will ensue will depend on the demand-sensitivity of wages, i.e. in the extent to which the rate of wage inflation will decline with a given decline in the scarcity of labour.[1] In all probability this sensitivity is quite high when labour is in short supply and profits are abnormally high; it is unlikely to be great when unemployment is moderate and profits still reasonably high; it may again become considerable when there is enough unemployment to undermine the power of the unions.

The following two types of causal factors will cause a temporary spurt followed by a temporary flagging in the process of inflation without permanently affecting the equilibrium rate of inflation or level of labour scarcity.

A shortening in the adjustment lag for wages will have the effect of bringing actual wages closer to 'target' wages for any given rate of wage and price inflation. Suppose such a shortening is carried out gradually over a period equal to the adjustment lag itself. In the first period wages and prices will rise at more than the equilibrium rate; velocity of circulation will increase and labour scarcity will decline. In the second period wages and prices will rise less fast than in the first period (*a*) because of the decline in scarcity, and (*b*) because, with a compensation ratio less than unity, the rise in the cost of living element in wage increase will not be as great as the intensification of wage inflation that occurred in the first period. Though for a time wages and prices may continue to increase faster than the money stock and though labour scarcity may continue to decline, a turning-point will occur in both respects. The rate of inflation will fall below the rate of monetary expansion and labour scarcity will rise again. In the end labour scarcity will settle down at its initial level and the initial rate of inflation will be restored. Actual wages and prices will then be the same as they would have been had the inflation gone on at the original rate[2] but 'target' wages will have been reduced by the cumulative effect of the temporary reduction of labour scarcity.

Suppose, now, that *an increase* takes place *in percentage profit margins in industry or in the ratio of farm prices to industrial prices.* As in the

[1] The greater the demand-sensitivity of profit margins, i.e. the more these margins contract as scarcity of labour and products declines, the *greater* will be the transitional intensification of inflation. The reason for this 'perverse' effect of reducing profit margins is discussed at p. 55 below.

[2] This must be so since money supply, output, and velocity will all be the same as if no disturbance had occurred.

previous case, price inflation will at first exceed monetary expansion, will then slow down—for the same reason as in the previous case—till it is less than monetary expansion, and will ultimately return to the initial situation of being equal to monetary expansion.[1] Labour scarcity will first decline, then return to the original level. As a result of this excursion into sub-equilibrium levels of labour scarcity, wages, after equilibrium is restored, will remain somewhat lower than they would have been in the absence of the rise in profit margins or farm prices. Indeed a rise in profit margins by raising the share of profits in the national income will probably reduce the velocity of circulation and hence effect a permanent reduction, not only in the level of money wages, but even in the level of product prices.[2] Owing to the nature of the distributional changes involved, a rise in the ratio of farm to non-farm prices is far less likely than is a rise in profit margins to involve a decline in the equilibrium level of general product prices. Indeed, if implemented through the accumulation of surplus stocks it is fairly certain to result in a velocity of circulation, and hence a level of prices somewhat higher than in the initial position.

In the three cases just considered, in which a temporary inflationary phase evoking a decline in labour scarcity is followed by a disinflationary phase accompanied by a return to the original equilibrium position, the violence of the inflationary interlude and the extent of the temporary decline in labour scarcity (and possibly employment and output) will both be the greater, the greater is the magnitude of the compensation ratio.

The Role of Official Policy

We have seen from the preceding section that once-over changes in the pricing policies and attitudes of firms, combines, trade unions, and governments are unlikely to exercise any permanent effect on the rate of price inflation, unless and in so far as they act on the growth of the money supply. Moreover, while in some cases the effects on the velocity of circulation and on the level of employment will be enduring, in other cases these effects also will be temporary. These conclusions are based on the operations of a particular model but are likely to hold true of any model in which wage growth is to any extent sensitive to changes in the scarcity of labour.

[1] If the initial position is one in which many finished goods are in short supply while others are produced under competitive conditions, a rise in margins might give rise to an increase in velocity with little or no decline in real demand for products. The scarcity of labour would then actually *increase* due to the rise in profit margins. As the intensified wage and price inflation reduces the range of products in short supply, however, declines in output will begin to occur which will reduce the scarcity of labour.

[2] If profit margins are raised in a situation in which products are underpriced, a small rise in margins by reducing product shortage may increase velocity of circulation. After a point, however, further increases in margins will tend to reduce velocity for the reason expressed in the text.

A continuing price-inflation, therefore, can only occur if there is a continuing expansion in the stock of money. Conversely, save in the extreme case where interest rates are at those minimum levels at which the willingness to hold additional quantities of money unspent becomes indefinitely great, a continuing expansion in the stock of money, with given pricing practices, will always produce a continuous rise in prices.

It might seem, therefore, that the nature of the conditions governing pricing have little to do with the policies it is appropriate for the authorities to adopt with respect to inflation, and that in all cases the course appropriate from an economic, however difficult from a political, standpoint is to curtail the expansion in the flow of money demand and in the stock of money.

In so far as the prevention of inflation is regarded as in all circumstances the overriding objective of policy, this conclusion appears to be correct. The significance of non-competitive pricing lies in the possibility that in certain circumstances it may render disinflationary financial policies so damaging to savings and investment, or even to employment, output, and consumption, that it becomes doubtful how strongly and how quickly they should be applied and whether they should not be supplemented by other policies designed to act more directly on prices.

In order to evaluate the importance and relevance of this consideration let us examine the effects, under conditions of non-competitive pricing, of varying the rate of expansion of the money stock.

In terms of the economic model considered in the previous section, any permanent increase in the rate of expansion of the money stock will in the end bring about a corresponding increase in the rate of growth of money wages. To some extent this will be effected through a rise in the cost of living element in wage growth. But so long as the compensation ratio is less than unity there will also have to be some increase in the 'scarcity' element in wage growth,[1] and, consequently, some increase in the scarcity of labour, whether in the form of reduced unemployment or increased shortage. This effect will be the greater (*a*) the smaller is the compensation ratio, and (*b*) the smaller is the sensitivity of wage growth with respect to changes in labour scarcity. The new and higher equilibrium level of labour scarcity will be associated with a new and higher level of product scarcity also, and with a new and lower equilibrium level of velocity of circulation.

In addition to the permanent increase there will also be a temporary increase in the scarcity of labour and products, provided that the movement in actual wages lags behind that of target wages. When labour scarcity first attains its new equilibrium level, actual wages and prices will not yet be rising as fast as the money stock. The 'scarcity' element in

[1] See equation (4, p. 51).

wage increase will reflect the lower level of labour scarcity prevailing one period earlier while the 'cost of living' element will reflect even lower and earlier levels of scarcity.[1]

In consequence the scarcity of labour and of products will go on increasing and the velocity of circulation will go on declining, past the new equilibrium point, until such time as the decline in the 'scarcity' element in wage growth brings about a turn of the tide, and labour scarcity once more declines toward the new equilibrium level. The *permanent* increase in labour scarcity that will result from a given increase in the rate of monetary expansion will be the greater the smaller is the extent to which wages are compensated for changes in the cost of living and the *temporary* increase in labour scarcity will be the greater the longer is the time-lag of actual behind target wages.

Now it is probable that the extent to which wages are adjusted in compensation for price changes, and the time-lag with which wages are so adjusted, are both dependent on the degree of inflation itself. The faster prices rise beyond a very moderate rate of increase the more fully will wages be compensated for changes in the cost of living, and the faster prices rise beyond a more rapid rate of increase the shorter will be the time-lag of adjustment. It follows from this that whereas a rise in the rate of monetary expansion from a position of price stability may well yield a permanent increase in labour scarcity, a similar intensification of an inflation that is already substantial may yield little or no permanent increase in labour scarcity, while finally an intensification of an inflation that is already rapid may yield little even of a temporary increase in labour scarcity.

The desirability of a given increase in labour scarcity depends very much on whether it takes the form primarily of a decline in overpricing (unemployment) or of an increase in underpricing (labour shortage) and also on the extent to which it is accompanied by increased underpricing (shortage) of products. The only merit of an increase in the shortage of labour lies in the fact that the increase in the proportion of non-wage to wage incomes with which it is associated tends to bring about an increase in the proportionate of national income which is saved and hence makes possible an accelerated rate of development. The importance of this type of 'forced saving' no doubt considerably exceeds that (referred to on page 40 above) which results from the lag between the earning and the spending of income. As against this advantage of an increase in labour shortage must be set the disadvantages that it will entail, viz. (*a*) increased inequality in the distribution of income and consumption, and (*b*) increased distortion of economic

[1] When there is a lag of actual wages behind target wages and actual prices compared to actual wages, the cost of living element in wage growth approaches its equilibrium relationship to any given value of the 'scarcity' element in wage growth only gradually and asymptotically over an indefinite time period.

incentives. When labour and products are in short supply their allocation and utilization are to some extent arbitrary, wasteful, and irrational. Moreover, shortages that are brought about by an intensification of inflation are likely to be more acute in some sections of the economy than in others—a circumstance which tends to aggravate their disturbing effects. On the other hand, an increase in labour scarcity which takes the form of a decline in unemployment will carry with it the advantages not merely of evoking additional savings and investment but also of permitting an increase in consumption as well; not only will the national product be increased by absorbing the unemployed, but the utilization of the previously employed manpower will probably improve. In addition there are intangible but important gains in the form of increased security and increased self-respect among the working people.

The foregoing argument has related to an increase in the rate of expansion of the money stock. A curtailment in the rate of monetary expansion will have the opposite effects. It will tend to bring about (*a*) a decline in labour (and product) scarcity that will be 'permanent' unless it gives rise—as it probably will in the end—to a loosening of the link between wages and the cost of living, and (*b*) an essentially temporary decline in labour (and product) scarcity. The more serious is the initial rate of inflation the smaller are likely to be both the permanent and the temporary declines in labour scarcity; and the higher the initial degree of labour scarcity the more desirable is any decline that does occur.

Disinflationary financial policies should be continued so long as they do not threaten to give rise to a significant amount of permanent unemployment. They should not be abandoned at the first sign of unemployment, which may well be of a temporary character. However, when conditions in the labour market are such that an excessive degree of price and wage inflation persists despite the fact that substantial unemployment has prevailed for some time, a severe policy dilemma may arise. In this case much depends on the size of the compensation ratio. If the inflation has gone on so long that wage/price links affording a high degree of compensation for cost of living changes are widespread, a further reduction in the rate of monetary expansion may be defended as involving little additional unemployment. On the other hand, where cost of living compensation plays but a minor role there will be a case for at least postponing the application of a disinflationary policy which could restore price stability only at the cost of a substantial loss in employment and output.

In such circumstances the question arises whether the government should not seek to reconcile the objectives of full employment and price stability by influencing the process of wage and price determination itself. There are various methods that might be adopted to this end.

One method that is frequently resorted to is the subsidization of consumer goods, particularly those consumed by wage earners. If the subsidies are financed in large part by taxation of profits and higher incomes they are quite likely to lead to some decline in the rate of growth of target wages, not only in money but even in real terms, inasmuch as part of the reason why workers demand increased wages is to maintain or improve their position relative to other groups in the community. Nevertheless, to effect a permanent increase in the levels of employment and output that are compatible with price stability would call for a continual increase in such subsidization. The effect of this would be intolerable in the long run, since if financed by taxation it would call for a continual redistribution of income in favour of labour, while if financed by government borrowing it would entail a progressive decline in the proportion of investment to consumption. Subsidization is therefore of value only as a means of meeting temporary situations, such as adverse shifts in the terms of trade, or else as a means of holding the wage price spiral in check pending the application of more fundamental measures of control.

The same objection, that its efficacy is merely temporary, is equally applicable to any attempt that may be made, whether through controls or other anti-monopolistic policies, to reduce consumer prices or profit margins without recourse to subsidization. Such policies have to be widely applied if they are to be of any use in keeping down consumer prices. They can only hold up the wage price spiral for so long as it is feasible to continue squeezing profit margins, which is probably not for very long. The compression of monopolistic profit margins may, of course, be desirable in itself, quite apart from any disinflationary effect. Moreover, some measure of control over prices and profits may well be indispensable politically as a means of inducing the workers to acquiesce in wage-control. But it is the propensity of target real wages to rise excessively that is the key to the difficulty of maintaining full employment without inflation, and it is unlikely that this propensity can be overcome without some direct official intervention in the process of wage determination.

This is not the place to discuss the possibilities and dangers of different forms of wage control. A measure of control may be exercised informally, by remonstrating with the unions, or by stiffening the backs of employers, as well as by the exercise of legal authority. If legal means are applied they may be directed towards lengthening the process of negotiation, or limiting the extent of wage increases that may be granted, or they may go so far as to prescribe the actual wages that are to be paid. In any event the crucial—and most difficult—problem is to limit increases in the generality of wages while allowing for the changes in relative wages that are necessary to attract labour into the proper channels or to satisfy the requirements of equity.

Assuming that it is feasible so to control the process of wage-determination as to permit a reconciliation of full employment and price stability, this does not in any way remove the necessity for controlling the rate of expansion of the money stock. In the absence of an appropriate monetary policy prices might rise excessively even if wages did not, or if prices also were controlled product shortages might be intensified. The true relation between monetary policy on the one hand and price and wage policy on the other is complementary, not competitive. There may be occasions where the case for permitting a mild degree of inflation to prevail as a means of increasing the level of economic activity is strengthened by the consideration that if the inflation should tend to get out of hand it can be curbed by an effective wage policy. There may even be occasions where to permit inflation to continue may be the best means of persuading all concerned of the necessity for an effective wage policy. With these qualifications, however, the basic relationship of wage policy to financial policy is that an effective wage policy would tend to remove any objections there might otherwise be to the pursuit of a disinflationary financial policy.

Classification of Inflations

In the light of the foregoing analysis it is possible to venture certain conclusions as to the feasibility and relevance of classifying inflations with reference to demand and to cost respectively.

It seems necessary to distinguish two principles of classification. According to the first principle price inflations may be divided into three categories: (1) demand determined, (2) cost determined, and (3) cost-and-demand determined. According to the second principle inflation may be classified as (*a*) demand induced, and (*b*) cost induced.

Inflations which occur at full employment or at a fixed degree of employment of resources, with consumer prices perfectly flexible, may be said to be '*demand determined*'. This will be the case where consumer prices are arrived at by perfect competition and where all factors and intermediate products are either competitively priced or underpriced or, if overpriced, are subject to a constant degree of monopolistic restriction of supply.

Inflations which occur when consumer prices are insensitive to variations in demand may be said to be purely '*cost determined*'. This condition is satisfied when, in all branches of production, wages are uninfluenced by the degree of labour scarcity and profit-margins are unaffected by the level of demand or by the degree of underpricing of labour. Inflation would then take place as a result of attempts to secure mutually incompatible levels of real or relative incomes, e.g. in the form of a wage price spiral.

All other inflations constitute a mixture of demand determined and cost determined inflation, because wages, profit margins, and farm prices,

though not entirely flexible, are in some degree influenced by demand. This is, of course, by far the commonest category of inflation.

Demand-determined inflations may also be said to be '*demand induced*'. Cost-determined inflations, however, cannot always be said to be '*cost induced*', or to exemplify a 'cost push'. Thus it may well happen that though a moderate wage/price spiral is in progress money demand is high enough to keep both labour and consumer goods underpriced (i.e. in short supply) and is expanding as fast as or faster than prices. Then only the fact that the system is cost-determined keeps the inflation from being as severe as it would otherwise be.

Among the inflations of mixed determination it is natural to attempt to distinguish those inflations, or phases of inflation, which are predominantly demand-induced from those that are predominantly cost-induced. The criterion in this case might be the trend in the scarcity of labour and of products. Inflationary phases associated with growing overpricing (or declining underpricing[1]) would be deemed cost-induced, while those associated with declining overpricing (or growing underpricing)[1] would be deemed demand-induced.

If this conventional criterion is adopted, however, it is necessary to bear in mind that either type of inflation may mask a potentiality for the other. A slackening in the growth of money demand may reveal the underlying upward pressure of costs and initiate a phase of cost-induced inflation. Conversely the cessation of an increase in overpricing may reveal an underlying pressure of demand which will perpetuate the inflation though at a lower rate. It follows from our analysis that cost-induced inflation is of an essentially temporary character. Even without any change in psychological attributes or institutional arrangements the increase in unemployment to which it leads will itself suffice to bring it to an end.

On the other hand, not only does increased overpricing tend to speed up the turnover of money and flow of demand but in many cases that, on our definition, lie on the borderline between demand-induced and cost-induced inflation, the expansion in demand is motivated by the desire on the part of monetary authorities to defeat or offset tendencies to overpricing and the associated unemployment and underproduction.

The distinction between demand-induced and cost-induced inflation is frequently held to entail important consequences for policy, to the effect that while it is appropriate to deal with a demand-induced inflation by curtailing the expansion of money demand, a cost-induced inflation should be dealt with by other action bearing more directly on costs and prices.

[1] Only changes in the underpricing of finished goods are relevant here and even in the case of finished goods a decline in underpricing involves not only a rise in costs but also an equivalent expansion—or liberation—of demand. But the expansion of demand as well as the rise in prices may be regarded as induced by the rise in costs.

As we have seen in the previous section, however, it is not so much the trend in the scarcity of labour and products that is important from the standpoint of policy as the absolute level of that scarcity, and specifically the level of actual and potential unemployment.

MILL AND CAIRNES ON THE RATE OF INTEREST

By L. C. HUNTER

WHEN John Stuart Mill was preparing the sixth edition of his *Principles of Political Economy* in 1864, he received from his friend John Elliot Cairnes[1] a set of notes compiled by the latter on the basis of the previous edition. A prominent section of these notes was devoted to the theory of the rate of interest and Cairnes put forward at some length his own approach to the theory—an approach which diverged markedly in places from that currently held by contemporary economists, including Mill himself. The purpose of this paper is to study Cairnes's influence on Mill's theory of interest, but first it will be necessary to see how Mill's thought developed. There are three stages in this development, the first of which is marked by the fourth of the *Essays on Some Unsettled Questions of Political Economy* which were written in 1829–30 although not published until 1844. Secondly, there is the treatment of interest in the pre-1865 editions of the *Principles*, and thirdly, Mill's final position as denoted by the sixth edition of that work. The two later stages are undoubtedly the most important, and although we shall be concerned with the relationship between all three stages, our attention will be devoted mainly to the exposition of the theory in the *Principles*.

On receiving the notes from Cairnes, Mill expressed his delight in a letter of acknowledgement (dated 12 December 1864) as follows:

> I do not know how sufficiently to thank you for all you have done for me. That you should have taken the trouble to write out your thoughts so fully on so many points, only for my use, is a favour such as I should never have presumed to ask from you. . . . On the few points of doctrine on which our opinions differ, you have not, thus far, convinced me, though you have taught me much. Among these I do not count the theory of the rate of interest, for I entirely agree with your explanation of the phenomena.[2]

This last sentence raises a problem which must claim some of our attention in the following pages, for it becomes clear as we compare Cairnes's notes on interest and Mill's revision in the *Principles* that while Mill has undoubtedly borrowed some ideas, he does not appear to have grasped the full significance of Cairnes's treatment. It is possible on the other hand that Mill was at the time unable to incorporate such a theory into the analytical framework of the *Principles*, although he agreed with the opinions of Cairnes. At any rate there is some doubt on this point, and

[1] Cairnes was at this time Professor of Political Economy at Queen's College, Galway. In 1865 he removed to London and became a close neighbour to Mill.

[2] *Economica*, Nov. 1943: 'J. S. Mill and J. E. Cairnes', by G. O'Brien, p. 280.

as it may have some bearing on the proper interpretation of Mill's interest theory, there seems to be good reason for a somewhat detailed investigation.

A further consideration makes this of interest for the history of economic thought. It is only comparatively recently that access to Cairnes's notes has been possible, for they were untraced until 1943 when in company with a valuable collection of papers, letters, &c., by and concerning many of the English classical economists, they were discovered at the home of Mr. F. E. Cairnes in Co. Dublin.[1] Much of this material has since been published in Mr. Piero Sraffa's edition of Ricardo's works and in Professor O'Brien's selection from the Mill–Cairnes correspondence (*Economica*, November 1943). Cairnes's notes, however, have been neglected—undeservedly, it would seem.

I now go on to the main considerations of this paper.

I. Interest in the Unsettled Questions

In the Preface to the 1844 edition of the *Unsettled Questions* Mill denies any important alteration from the original of 1829–30 and in view of this the following extracts from letters of Mill to J. P. Nichol, later Professor of Astronomy at the University of Glasgow, are interesting:[2] Mill writes:

> As for those Essays, not merely do I not want them, but I beg you to keep them by you a while longer, and to annotate them copiously—they have much need of it. By-the-bye, I believe almost all that I have written in the fourth essay concerning Interest is erroneous. . . .(15 April 1834.)

And again,

> About publishing my concluding essay in the Review; I think with you, but am afraid it would take up too much room. The essay on gluts must be entirely remodelled; there is much new speculation to be added to it. I think I shall, some time or other, write a Treatise on the whole Science. I am fearful that the Essay on Wages and Profits, which you say you do not quite understand, is little better than elaborate trifling, and that the doctrine that profits depend on wages, though scientifically correct, does not present the more important aspect of the law of profits, perhaps not the ultimate law at all, and is, therefore, of little use in philosophy. The whole of the speculation on productive and unproductive I must revise, or rather reconsider *ab initio*. I am impatient for your remarks on the Commercial essay. There is no hurry about the MSS. . . . (30 August 1834.)

From the above descriptions it is quite clear that the essays referred to are the later *Unsettled Questions*; equally obvious is the fact that Mill was satisfied with the first and the last alone, on International Trade and the Definition of Political Economy respectively. Since the manuscripts have never been discovered, we can but take Mill's word for it that only 'a few

[1] For the full history of this discovery see the Preface to volume i of *The Works and Correspondence of David Ricardo* (ed. P. Sraffa).

[2] Some of the Mill–Nichol correspondence is collected in the *Fortnightly Review* of May 1897; it is from this that the two present quotations are taken.

merely verbal alterations' were made for the 1844 edition. Nevertheless, these quotations indicate a fairly severe self-criticism on the part of Mill, and for our present purpose it is important that although in 1844 Mill gave his opinion that his discussion of interest was almost entirely erroneous, he saw fit to publish the original without change in 1844. It seems reasonable to assume that at this later date he was in agreement with the views expressed earlier despite his volte-face in the interim, and it is difficult to explain his inconsistency. But I shall return to this at a later stage.

Mill's purpose in the fourth essay, the second part of which deals with Interest, becomes evident in his criticism of the state of interest theory at the time. The accepted view, we are told, is that 'the rate of interest varies from day to day according to the quantity of capital offered or called for on loan; but conforms on an average of years to a standard determined by the rate of profits, and bearing some proportion to that rate—but a proportion which few attempts have been made to define'.[1] From the imprecision of this view it was usually asserted that the rate of profit at any time and place could be approximately judged by the rate of interest at that time and place, 'it being supposed that the rate of interest, though liable to temporary fluctuations, can never vary for any long time unless profits vary—a notion which appears to us erroneous'.[2]

These two propositions which Mill questions imply a third, namely that in the long run the rate of interest would be invariable in so far as the rate of profit remained constant. In criticizing these propositions Mill was betraying some dissatisfaction with an important constituent in the Ricardian theory of interest. Mill's concern was to show that the rate of interest was subject to influence from factors other than the rate of profit or more precisely the rate of return from physical capital. The first step was to ascertain the determinants of interest *in the long run* not from the point of view of the physical productivity of capital, but from that of the structure of society and the basic psychological dispositions of certain social groups. Thus he argues that given

> the aggregate sum which people are willing to borrow at some given rate, the rate of interest will depend on the quantity of capital owned by people who are unwilling or unable to engage in trade. The circumstances which determine this are, on the one hand, the degree in which a taste for business, or an aversion to it, happens to be prevalent among the classes possessed of property; and, on the other hand, the amount of the annual accumulation from the earnings of labour.[3]

As for the demand for loans, Mill says this will depend only on the power of the borrower to give adequate security and on the prevalent uncertainty facing the individual producer. Thus he holds that even those 'the

[1] *Unsettled Questions*, pp. 106–7 (1st ed. references throughout).
[2] Ibid., p. 107.
[3] Ibid., p. 112.

state of whose business encourages them to add to their capital by borrowing . . . are disposed to borrow only as much as they see an *immediate* prospect of profitably employing.'[1]

Given these determinants, the rate of interest will be settled at an equilibrium level at which the demand for loans (of capital) and the supply of loans are equal. It is evident from this that the 'natural' rate of interest does not depend solely on the rate of profit, which is the proposition Mill was trying to refute. Mill, in approaching the question from this direction, is at this point closer to Smith than to Ricardo, an odd situation for a personal disciple of the latter himself. Where Ricardo was concerned to erect a watertight structure with each factor assigned a logical place, Mill was here more concerned with the broader foundations of the logic, and the result was a return to the semi-sociological, semi-psychological outlook so characteristic of Adam Smith.

From this point Mill goes on to introduce disturbing forces, beginning with the case where the government is obliged by the outbreak of war to enter the loan market, thereby upsetting the existing equilibrium, increasing the demand for loans and consequently raising the rate of interest. This change, continues Mill, will tend to upset the planned pattern of consumption and saving, and funds will be diverted into the loan market, tempted by the augmented rate of interest. Thus a new equilibrium will be attained, ceasing when the government's demand for loans comes to an end. From this and the above argument, Mill feels justified in drawing the conclusion that 'although the rate of profit is one of the elements which combine to determine the rate of interest, the latter is also acted upon by causes peculiar to itself, and may either rise or fall, both temporarily or permanently, while the general rate of profits remains unchanged'.[2] In this way Mill hoped to establish his conviction that the long-term rate of interest was in some measure independent of the rate of profits and this was, of course, in contrast to the Ricardian doctrine.

Quite clearly, even at this stage, Mill had grasped the importance of the psychological factors acting upon the rate of interest and this is again stressed in the *Principles*. But before progressing to this, some incidental points are worthy of attention. Firstly, there is the question of Mill's criticism in 1834 of the essay written four years earlier. There is no apparent reason in contemporary events for this change of mind. The rate of interest was not affected by any legal, commercial, or theoretical changes and we might plausibly assume that the explanation lies rather in the progress of Mill's thought. There may even have been a certain self-recrimination for his disagreement with the Ricardian doctrine which, we know, he was earnestly attentive to uphold. By 1844, at any rate, the

[1] *Unsettled Questions*, pp. 111–12. Italics in original.

[2] Ibid., p. 114.

earlier version appears to have been restored to favour and was published as it stood. Meanwhile, two changes had taken place which might be regarded as making Mill's essay incomplete, if not obsolete. In 1836 there was the appearance of Nassau W. Senior's *Outline of Political Economy* in which abstinence was introduced as an element of cost of production; this, of course, had relevance for the theory of interest. Mill was undisputably aware of this work, making brief notes on it shortly after its publication and commenting expressly on the use of abstinence as an agent of production.[1] I have not time to go into this here, but there is sufficient indication that Mill had been impressed by the usefulness of this concept. Yet he evidently saw no reason for altering his essay to include this innovation, and it is only when we come to the *Principles* that Mill employs it.

Another change occurred in the repeal of the Usury Laws in 1837, until which date the maximum legal rate of interest was 5 per cent. The repeal in itself was perhaps not the most important thing, for it was rather a symptom of the revival of interest in the question after an apathy which had stretched over the ten preceding years. With the new evidence which was being turned over and the realization then growing among bankers and politicians that there was a strong relation between foreign exchanges, interest rates, and prices, Mill's reflections on interest might have appeared somewhat behind the times. If we are to attempt an explanation of this, we must seek it in the fact that the essay does not seem to have been intended as an all-embracing or in any way definitive exposition of the interest factor. Rather it was directed at certain specific points in the interest mechanism which were to be explained in the essay from the point of view of pure political economy, without any necessary relevance for the practical issues of the day; although it was no doubt hoped that the explanation of the phenomena would contribute to the understanding of these issues. Besides, by 1844 Mill had probably formed the purpose of writing a major economic work in the near future and in this a more adequate explanation could be attempted. The next step is to see just how Mill fared in his later treatment of the question.

II. Interest Theory in the pre-1865 Editions of the *Principles*[2]

The treatment of interest in the *Principles* is scattered and lacks integration. There are several strands of thought which, had they been linked up, might have provided adequate if somewhat crude explanations of the concept, or at least a coherent foundation from which further inquiries

[1] These notes were published in *Economica*, Aug. 1945, with an introduction by Professor F. A. Hayek.

[2] All page references are to Sir William J. Ashley's ed. of Mill's *Principles* except when otherwise stated.

might have set out. Saving and abstinence are discussed briefly in Books I and II but without much relation to the question of interest. The position becomes clearer in Book IV, however.[1] There Mill, in dealing with the minimum rate of profit necessary for investment to continue, argues that this minimum rate depends on 'the strength of the effective desire of accumulation' and 'the degree of security of capital engaged in industrial operations'. The first of these, involving 'The comparative estimate, made by the people of that place and era, of future interests when weighed against present',[2] affects the *inclination to save*, while the second affects *the disposition to employ savings productively*. Thus we have the conditions for the two distinct aspects of saving—the decision, firstly, not to spend; and secondly, that how to dispose of the amount saved. Mill goes on to point out the possibility of hoarding and this introduces us to the reason why a certain amount of saving takes place. In Mill's words,

> there is in every country some rate of profit, below which persons in general will not find sufficient motive to save for the mere purpose of growing richer, or of leaving others better off than themselves. Any accumulation, therefore, by which the general capital is increased, requires as its necessary condition a certain rate of profit; a rate which an average person will deem to be an equivalent for abstinence, with the addition of a sufficient insurance against risk.[3]

Here Mill is perhaps a little more ambitious in his presentation of the relationship between the rates of interest and of profit than in the earlier essay, but given the equipment he now had at hand, his treatment is still unsatisfactory. If Mill is uncertain at this stage, how does he fare in his chapter devoted exclusively to the rate of interest (Book III, chapter 23)?

There we discover that 'the rate of interest will be such as to equalize the d mand for loans with the supply of them',[4] but from the context it is quite clear that Mill regards these as *loans of capital*, thereby holding to the position of the essay. This, indeed, had been the form of approach to interest theory since Adam Smith, for although prior to 1776 the concept of interest had been understood fairly well as a *monetary* phenomenon, Smith transferred attention to what we may call its 'real' aspect. Thus we find in *The Wealth of Nations*: 'Almost all loans at interest are made in money, either of paper, or of gold and silver. But what the borrower really wants, and what the lender really supplies him with, is not the money, but the money's worth, or the goods which it can purchase. . . .'[5] Now this is really true only so far as the borrowing is incurred for investment purposes but, as Smith was well aware, loans might be put to 'unproductive' uses—in paying off debts, for example: here (as in the liquidity motives which

[1] The core of Mill's interest theory, which we by-pass for a moment, is in Book III, chap. 23.

[2] *Principles*, p. 728. [3] Ibid., p. 729. [4] Ibid., p. 638.

[5] Op. cit. (Cannan ed.), vol. i., p. 333.

were stressed by Keynes at a much later date) it was the money itself which was important, and not its purchasing power, at least in the first instance. Thus Smith by diverting attention from the monetary aspect of the loan market lost track of some important economic factors and this approach was to be quite characteristic of the next hundred years. Ricardo, of course, had taken it up, although within his own artificial but rigorously logical scheme the omission was toned down. Mill, however, in trying to relax some of the Ricardian assumptions, remained trapped by the approach even, as is shown at a later stage, when Cairnes suggested a way out.

Returning to the chapter on the rate of interest, we find that Mill repeats at somewhat greater length the introductory remarks of the essay. In particular, Mill's catalogue of items comprising the demand and supply of loans is more detailed and from this he goes on to observe that interest fluctuations 'depend almost entirely upon the portion[1] which is in the hands of bankers; for it is that portion almost exclusively which, being lent for short times only, is continually in the market seeking an investment'.[2] Attention is thus focused on the credit-supplying functions of the banks, which was dealt with only briefly at the end of the essay on Interest. There, Mill had argued, with Ricardo, that the function of banks (of credit) was to increase the capital *in activity* at any moment, leading to a tendency for the rate of interest to fall; but he had also maintained, in direct opposition to Ricardo, that where a bank was able to issue notes, capital would be increased *absolutely*. If the currency issued by the banks was *convertible*, he wrote, 'it cannot get into circulation permanently without displacing specie, which goes abroad and brings back an equivalent value. To the extent of this value, there is an increase of the capital of the country; and the increase accrues solely to that part of the capital which is employed in loans.'[3]

Presumably, what Mill was here arguing for was that the displaced specie would bring back goods which would in the first instance accrue largely to the lending sector of the economy, and that these goods would at a later stage be employed in investment projects, thereby increasing output (through the increase of capital in the form of these imported goods). From the historical point of view it is interesting to remember that nineteenth-century England was the major exporter of capital to underdeveloped countries—this in addition, of course, to her foreign payments for imports, mainly of food and raw materials. Mill seems, at the early stage of his career, to have somewhat neglected the first aspect, the export of capital, which would not at once be returned to the home country in the

[1] i.e., of capital.

[2] *Principles*, p. 640. Note also Mill's explicit omission of speculative funds in the footnote to that page.

[3] *Unsettled Questions*, pp. 117–18.

form of goods but which would rather filter back over the years in a steady stream, often to be reinvested abroad.

Alternatively, Mill continues, if the currency was *inconvertible*,

> and instead of displacing specie depreciates the currency, the banker by issuing it levies a tax on every person who has money in his hands or due to him. He thus appropriates to himself a portion of the capital of other people, and a portion of their revenue. The capital might have been intended to be lent, or it might have been intended to be employed by the owner: such part of it as was intended to be employed by the owner now changes its destination, and is lent. The revenue was either intended to be accumulated, or it was intended to be spent: in this last case, revenue is converted into capital; and thus, strange as it may appear, the depreciation of the currency, when effected in this way, operates to a certain extent as a forced accumulation.[1]

To Mill, then, an increase in the supply of money, *as such*, was likely to increase the amount of capital in the country *absolutely*—a doctrine which was completely rejected by Ricardo, bound as he was by a rigid quantity theory of money. It will be noted, of course, that this increase in the supply of loanable funds will be operative in lowering the rate of interest—again without any *necessary* corresponding change in the rate of profits, although the accumulation of capital might also decrease the latter.

How does this compare with the treatment of the same subject in the *Principles*? The following passage clearly indicates Mill's position:

> . . . how great an error it is to imagine that the rate of interest bears any necessary relation to the quantity or value of money in circulation. An increase of the currency has in itself no effect, and is incapable of having any effect, on the rate of interest. A paper currency issued by government in the payment of its ordinary expenses affects the rate of interest in no manner whatsoever. . . . It is perfectly true that in England, and most other commercial countries, an addition to the currency almost always *seems* to have the effect of lowering the rate of interest because it is almost always accompanied by something which really has that tendency. The currency in common use, being a currency provided by bankers, is all issued in the way of loans, except such part as happens to be employed in the purchase of gold and silver. The same operation, therefore, which adds to the currency, also adds to the loans, or to the capital seeking investment on loan; properly, indeed, the currency is only increased in order that the loans may be increased. Now though as currency these issues have not an effect on interest, as loans they have.[2]

Mill is limited in his outlook here by his conception of interest only as a 'real' phenomenon: the effects of changes in the money-supply are on this account excluded from having any effect on other aspects of the economy. That such changes might in themselves have some effect by altering the valuation of non-liquid assets and stocks, disturbing the commodity markets by changing the prices of goods and consequently altering the expenditure- and saving-plans of different consumer-groups, and causing liquidity-preferences (and cash-holdings) to be revalued, &c., were con-

[1] *Unsettled Questions*, p. 118. The idea of 'forced savings' was not, of course, original.
[2] *Principles* (1st ed., 1848), vol. ii, pp. 185–6. Cf. Ashley ed., pp. 644–5.

siderations shut out from Mill's ken, due to his non-recognition of interest as a monetary factor. The proper meaning of Mill's earlier statement that fluctuations in the rate of interest depended upon the capital in the hands of bankers, now becomes clear. Increase or decrease of the currency through banking operations meant an extension or diminution of the credit of the community in activity at any time, and we are thus brought back to the Ricardian position. This issue may well be one of the points Mill had in mind when he criticized his essay on interest in 1834, although it is still hard to reconcile his publication of that essay ten years later with the change of opinion just observed in the *Principles*.

The key to this somewhat confused sequence of events perhaps lies in the way in which Mill's thought developed. At the early stage of his career he evidently believed that the Ricardian treatment of interest was in some measure unsatisfactory. His attempt to remedy this met with some success but for some reason or reasons (among which we may suggest the influence of the banking discussions and particularly Tooke's writings) he discarded this, reverting to the possibly more secure position of Ricardo and leaving behind him in the process a few untidy ends quite uncharacteristic of Ricardo himself. Mill could not have been very satisfied with this state of affairs, and he had in addition failed to incorporate Senior's abstinence theory into the main core of his analysis—in fact he never accomplished this. There was a fairly obvious need for an infusion of new ideas and when they presented themselves in the shape of Cairnes's notes, Mill immediately showed his relief, even if events proved that he failed to exploit them to the full.

III. Cairnes's Notes on Interest

From Adam Smith onwards, the general classical approach to interest was non-monetary, and the rate of interest was considered to be determined in the short-run by the demand and supply of loans of capital. Cairnes is unable to accept this and, in his notes,[1] commences with the following criticism:

> It cannot be denied that the thing lent is money—the medium of exchange; but you say that though money passes formally, in reality it is capital which in such transactions is passed from hand to hand. I maintain, on the contrary, (1) that in the case of a large class of loans 'capital' does not pass in any sense other than that in which the word is identified *either* with the medium of exchange *or* with commodities consumed, unproductively—that is to say, in which either 'capital' and 'currency' or 'capital' and 'non-capital' are confounded; (2) that where in a certain sense 'capital' may be said to pass—i.e. where the money borrowed is employed in the purchase of 'capital'—this does not entitle us to call the money 'capital'. . . according to this way of speaking, all that portion of the circulating medium which is employed in effecting exchanges of capital should be called 'capital'; (3) that the

[1] The original is housed in the British Library of Political and Economic Science, London.

straining of nomenclature, as is done in such explanations, is prejudicial to a clearer apprehension of monetary phenomena . . . (and this may cause us) . . . to perceive but obscurely, the operation of some powerful, but not obvious, influences on the course of the Money Market.

The main point to be attacked by Cairnes is obvious right from the beginning, namely the characteristic tendency of Mill and his predecessors to concentrate on the 'real' phenomena of the money market, to the detriment of effects which money may have in its own right. What they regarded as important was the real transfer of goods behind the 'monetary veil'. It is, of course, quite possible to argue that the execution of a loan involves a transfer of the *right* to a portion of the goods available to the community. But it was not sufficiently realized, for reasons which will emerge later, that this 'right' may take a variety of forms, according to its use. Cairnes *did* realize this, particularly in his third criticism where the full relation between the money-market and the commodity-market is appreciated more than in the analysis of the other 'classics'—precisely because they failed to realize the significance of the distinctive functions and consequences of capital and currency.

Cairnes goes on to expand his criticisms in the following way:

1. Mill was aware that loans might be employed 'productively' or 'unproductively' but he failed to realize that this conflicts with his earlier definition of capital. Cairnes seizes on this point:

Taking the case of money lent to a Government to be expended in war, or to a spendthrift to be expended in profligacy—the money itself is here not 'capital', if any distinction between capital and currency is to be preserved; nor are the things on which it is spent 'capital', unless we obliterate the distinction between productive and unproductive wealth. Apply your own test—'the mind' of the person owning the wealth; and I think you must admit that the loan belongs to the category—'not-capital'.

The reference here is to Mill's analysis of capital in Book I where it had been argued that the distinction between 'Capital' and 'Non-Capital' lay 'in the mind of the capitalist—in his will to employ them for one purpose rather than another; and all property, however ill-adapted in itself for the use of labourers, is a part of capital, as soon as it, or the value to be received from it, is set apart for productive re-investment'.[1] At this point I need only remark that the confusion in Mill and the other 'classics' arose from the near-fusion of the decision to save and the act of investment, primarily due to their lack of distinction between the functions of the capitalist and the entrepreneur. Cairnes returns to this in the second criticism and it need only be noted here that if a loan is spent unproductively, it no longer constitutes 'capital', no matter what the original owner intended.

[1] *Principles*, p. 56.

One escape-route exists for Mill—and this is effectively blocked up in the following way;[1] when Cairnes suggests that

> it may be said that the money borrowed by Government or the spendthrift would, but for their competition, have passed into the hands of productive borrowers, and that it may be regarded as so much capital withdrawn from the market. But first, the statement is not strictly true: a portion . . . of the money obtained by the Government is attracted to the loan market by the enhanced rate of interest caused by the Government demand, and would but for this inducement have been employed unproductively: so far as this is the case, the effect of the Government loan is merely to substitute one kind of unproductive expenditure for another; and, secondly, this way of describing the operation appears to me to obscure its real character. . . .

The rate of interest is now seen as a *determinant* of the economic system, in that changes in the rate will produce a revaluation of individual holdings of capital assets, alter cash-holdings, &c., presumably until a new equilibrium is reached.

2. Cairnes's second criticism is more involved. 'I cannot see', says Cairnes, 'why, because the money borrowed is afterwards applied to the purchase of "capital", it should therefore be said that "capital" is borrowed. We do not use language in this way when speaking of purchase and sale, why should we do so in speaking of loans?'

Even granting that the *money* borrowed from the capitalist is devoted to productive expenditure, this according to Cairnes is no reason for calling the money 'capital'. Mill's argument was that what was *really* borrowed was the right to a certain amount of goods and services—money was demanded not for its own sake but for the uses to which it could be put. Cairnes maintains, however, that the phraseology employed is open to the objection

> of comprising, and in fact confounding, under the same description two perfectly distinct acts—acts which are often separated by a considerable interval of time. The lending of the money produces a certain effect—an effect which is realized whether the subsequent purchase takes place or not; the purchase also when it takes place produces an effect, but this effect would be quite the same though the money had not been borrowed. A nomenclature which precludes the possibility of distinguishing effects distinct in character, and separated in point of time, must I think be pronounced essentially vicious.

The two questions at stake here are evident and call for little comment. Firstly, there are the effects on other parts of the economy by first borrowing and then spending. Borrowing in itself may cause prices to be depressed due to the diversion of money to savings, while once the loan is spent prices will tend to rise. Assuming that a large sum of money is involved and that a considerable time-interval elapses between the two acts, there may be a certain disequilibrium in the economy. But Mill

[1] Cf. ibid., p. 643 where Mill does employ this escape-route and maintains it even in the 6th ed. despite Cairnes's criticism.

would probably deny the possibility of such a delay. For it will be remembered that in the essay on Interest Mill had maintained that producers would only borrow when they saw an *immediate* prospect[1] of employing the loan profitably. This implies (correctly) that it would be pointless for a producer to borrow and so to incur interest payments merely in the hope that an investment opportunity would turn up. People do, in general, borrow for specific objects. Yet Cairnes's argument has some justification for Mill tended to believe that the sum borrowed would not only be employed immediately but would be used up almost instantaneously. In fact, it is more likely that the initial loan will be run down gradually as bills for wages, machinery, materials, &c., come in—this assuming that both fixed and circulating capital have been increased.[2] Other aspects of this appear in the course of the third criticism, which follows.

3. On the function of banks in relation to the cash-holdings of the public, Mill had observed in the *Principles* that

> when the practice . . . has grown up of keeping this reserve (i.e. for meeting immediate demands)[3] not in his own custody but with a banker, many small sums, previously lying idle, become aggregated in the banker's hands . . . the banker, being taught by experience what proportion of the amount is likely to be wanted in a given time . . . is able to lend the remainder, that is, the far greater part, to producers and dealers: thereby adding the amount, not indeed to the capital in existence, but to that in employment, and making a corresponding addition to the aggregate production of the community.[4]

Cairnes has two criticisms to make. The first is that it involves verbal inconsistency. He maintains that 'the sums which individuals hold in reserve against liabilities are clearly money, not capital; and all that your description proves is that Banks of deposit add to the *money* in employment, yet, without assigning reason for the change in phraseology, you substitute the word "capital" for "sums" which I think must be regarded as meaning "money".'

The only possible reason Mill could have had here in translating 'sums' into 'capital' was the preservation of the traditional outlook and terminology. For he was evidently aware that people *did* keep money, in its role as a completely liquid asset, for reasons such as the Keynesian 'transactions motive'. This could hardly be said to be capital, according to Mill's own definition of capital, involving as it did the intention of the possessor as to its disposal.

Cairnes's second criticism is more complex. To him, Mill's way of presenting the picture tended to obscure the monetary aspect of the process,

[1] Cf. *supra*, p. 66.

[2] The 'classics' generally did assume that technological- and wage-capital would be increased in proportion.

[3] My insertion.

[4] *Principles*, p. 513.

and his own version of the mechanism is as follows: 'The Banks by collecting together the stagnant money of the economy and rendering it active, *cause an effect on prices*, which results in increased importation, the money rendered redundant, through the economy effected by the banks, passing out of the country. The result of the whole is a larger amount of consumable commodities in the country and less money.'

There is an obvious parallel between this case and that of Mill's, involving an issue of convertible currency by the banks. We have already seen his argument in the essay where he concluded that the capital of the country would be increased by the value of the imported commodities. In the *Principles* this argument is expanded in the following way. An increase in the note-issue may take place *either* by manufacturers issuing notes in payment of wages, &c., or by government in payment of expenses; *or*, alternatively, by bankers in the ordinary way. In the first case only will the previously redundant money be 'converted into what is, or is capable of becoming, productive capital'. The money here is assumed to go straight into the commodity markets. But where the bankers are responsible for the increased note-issue, loans would in fact be increased, interest would fall and much of the money would flow abroad, seeking a greater return. Capital would not, therefore, be increased, at least in the short run.[1] Now let us see what Cairnes has to say of all this.

> The addition of consumable commodities *may* be employed productively, or they may *not*: if they are *not*, then the banks have neither increased capital in the country, nor have they rendered it more active: if the new commodities *are* employed productively, then the banks *have added* to the *aggregate amount* of capital in the country. In no case can I see that the banks have any tendency to render 'capital' more active. They render 'money' more active, by this means economize 'money', thereby enable us to dispense with a portion and get capital in exchange; and add to the aggregate amount of capital in the country in which they are established: ultimately, if the cause be traced to its last result, they add to the capital in existence by superseding the necessity of a portion of that which is employed in producing money, and thus setting it free for other purposes.

To this was added a footnote:

> On consideration it is fair to suppose that the new commodities would be employed productively; since the money rendered active by the banks would get into the hands of 'producers and dealers'. The prices first and principally affected would be those of commodities required by 'producers and dealers': the new commodities, therefore, would chiefly belong to this class.

At this point the difference between Mill and Cairnes seems to be not in the result itself, for both maintain that the ultimate effect will be an increase in the capital of the country, but rather they differ about the mechanism producing the result. Mill was well aware that capital was by

[1] Ibid,, pp. 630–2.

no means always fully employed,[1] and he believed that an increase in the money-supply, so far as it involved an extension of credit and hence of demand, would enable producers to enjoy a more rapid turnover of capital, would enable them to employ more labour and ultimately to reap larger aggregate profits. Cairnes, on the other hand, took a somewhat different view, and as we have seen above he argued that eventually capital would be increased 'by superseding the necessity of a portion of that which is employed in producing money'. But while Mill was prepared to allow that capital could be called into greater activity by an increased money-supply, this was explicitly denied by Cairnes.

Mill's failure to note the questionable nature of some of his assumptions (e.g., that the increased money-supply would be automatically devoted to investment) involved him in difficulties. Cairnes, while aware of the dubiety of some of these assumptions, could apparently see only one side of the picture, that of the displacement of capital engaged in the production of money—and this was not, perhaps, the most important aspect. Yet with his equipment he should have been able to correct Mill's analysis by pointing out that although the increase in the money-supply would tend to increase the demand for commodities and so raise prices, both of foreign and home-produced goods (this depending on the marginal propensity to import characteristic of the entrepreneurial class, into whose hands it was assumed the new money would flow); although these were the immediate effects, an increase in capital and hence in output would depend on the marginal propensity to consume of the entrepreneurial class. If the imported commodities—we have seen that both writers assumed that the increased money-supply would be sent abroad almost in its entirety—were devoted to productive investment, then employment and output would increase; whereas no such effect would take place if the imports were consumed 'unproductively'. Cairnes does get close to this at times but fails to make it explicit.

Cairnes, postponing for a moment his treatment of 'some important

[1] For example, in the second of Mill's 'Essays' we find the following: 'When we have thus seen accurately what really constitutes capital, it becomes obvious, that of the capital of a country, there is at all times a very large proportion lying idle. The annual produce of a country is never anything approaching in magnitude to what it might be if all the resources devoted to production, if all the capital, in short, of the country, were in full employment' (op. cit., p. 55). Cf. also ibid., p. 67, where Mill argues that it is not even desirable that full employment of capital should exist. Again, Cairnes in the first of the essays on the gold question, notes that an increased money-supply will raise prices, which will call forth increased production. How then will this increased production be possible? Cairnes's answer is, by a 'more extended employment of labour'. And he goes on to add that 'when once all the hands in a community are employed, the effect of a further competition for labour can only be to raise wages; and, wages once being generally raised, it is plain . . . that profits can only be maintained by a corresponding elevation of prices'. These passages serve as a sharp reminder that the classics by no means always assumed a full-employment equilibrium in their analyses.

influences on the money market', turns to the causes governing the rate of interest. The most fundamental point, in his opinion, is to establish the real relationship between the rate of interest and the productive powers of capital. This relationship he introduces as follows:

(1) the productive powers of capital are the conditions which render it possible that interest should be permanently paid: consequently the productiveness of capital sets the limit within which the rate of interest over long periods must confine itself; (2) since 'more will be given for the use of money when more can be made with money' the rate of interest will tend to rise and fall with the rate of profit.

[A footnote is added here:] A tendency, however, which as you point out in your letter of 1st December (just received) need not by any means necessarily be realized in fact, since other causes, such as those existing in the U.S. to which you advert, may more than neutralize it, leaving as the result a rate of interest in some places higher than in others where profits are higher.[1]

These two propositions, says Cairnes, establish the relation between interest and capital and this is of fundamental importance; but he will not admit it to be so important as to override the relation between interest and money, which the accepted theory does. Thus he argues that the rate of interest 'is *temporarily* not limited by anything, but the actual pecuniary means of borrowers at the time of effecting the loan, and does not, with any general conformity, follow the fluctuations in the rate of profit, often rising when profit—i.e. the productiveness of capital—is falling and *vice versa*; the *tendency* noticed being constantly more or less neutralized and frequently wholly overcome by influences of the opposite kind.'

What then regulates the short-term rate of interest? Cairnes answers as follows: it depends on '*the demand and supply of the community in relation to the amount of its money* (using the word in a large sense to include circulating medium of every kind which *practically* possesses purchasing and paying power, according to the purpose for which the loan is made) *disposable on loan*'. This statement, he says, differs little from that of Tooke in his tract on currency of 1826, but it differs radically from Mill's view as stated in the following sentence: 'An increase of the currency has in itself no effect, and is incapable of having an effect on the rate of interest.'[2] Cairnes on the contrary maintains that 'an increase of the currency *is* capable of affecting the rate of interest, and as a matter of fact almost invariably does affect it in one direction or the other'. Whereas, then, Mill had been limited by his approach to interest theory *via* capital analysis which naturally centred on 'real' characteristics of the economy, which could not according to his belief be altered merely by changes in the money-supply, Cairnes was able by virtue of his concentration on the

[1] This refers to a discussion of the comparative rates of interest and profit in this country and in the United States, which occupied much of their correspondence at this period.

[2] *Principles* (5th ed., vol. ii), p. 197. Note the correction of this view in the 6th ed. (Ashley, p. 647), when Mill admits that an increase of the currency 'issued by banks, tends, while the process continues, to bring down or keep down, the rate of interest'.

monetary phenomena to illustrate that changes in the money-supply would have some effect. Just what this was, he goes on to demonstrate:

> An increase of the currency (understanding by currency for the present simply circulating medium in any form which practically possesses purchasing or paying power) must take effect in one or other of two ways:—either through the medium of a loan, or through that of purchase: the persons into whose hands the new currency first comes either *lend* it, or *spend* it. Now in either case I contend that the augmentation will tend to affect the rate of interest. I observe you draw a distinction[1] between issues as currency and issues as loans. But this distinction seems to me exactly to beg the question in dispute. You say the issue as loans—no doubt—but loans of what?—of capital? This I deny and refer you back on this point to my previous arguments. I say that they are 'loans of currency' just as truly as money handed over the counter in exchange for a commodity is payment in currency. Well, if I am right in this it certainly follows that an increase of currency is capable of affecting the rate of interest—further the illustration shows that, when the increase takes place by way of loan, its tendency is to depress the rate of interest, in conformity with the doctrine as stated above:—The supply of money disposable on loan being increased, while the demand by hypothesis remains the same, the rate of interest falls.

This is all perfectly straightforward and need hardly be commented upon. Cairnes continues with the case where the increased money-supply takes effect through purchase:

> Here again, the rate of interest will be affected, though in an opposite direction. For the effect of an augmentation of the currency by means of purchase is to raise prices. Now as prices rise, the pecuniary needs of borrowers will increase, the demand for money on loan will therefore increase; but the supply of disposable money, according to our hypothesis remaining as before, the rate of interest will rise. Another consideration, noticed by you, will tend to strengthen this tendency: if the depreciation of the circulating medium be so rapid as to be perceptible, this will affect the inclination of those in possession of money to lend; thus at the same time that the demand for money on loan will increase, the supply will diminish; both changes operating in the same direction—towards an elevation of the rate.

Cairnes argues that as prices rise, the pecuniary needs of borrowers will increase. This is true, at least in the first instance, for more money will be required for each of the Keynesian liquidity motives—for transactions, for precaution and for speculation. In particular, with rising prices the speculative motive will be very important, since profit expectations will increase, previously marginal ventures will *appear* (and this is all that is important) to be now worth-while risks and the demand for loans will be increased. On the supply side, both Mill and Cairnes are agreed that if the depreciation is perceptible, the supply of loans will fall off. And this is acceptable, since people will hesitate in such a situation to part with money in the form of loans. Merely to hoard the money will evidently leave them even worse off than if they lent it, yet Cairnes suggests, or at least leaves open the possibility, that holders of money and liquid assets may want to retain money—and this is far from the truth. The more probable

[1] *Principles* (5th ed., vol. ii), p. 198.

effect will be a movement from cash into durable goods which may be expected to retain their value. In the end the result will be the same, a reduction of the supply of money on loan, and this tendency will, of course, be cumulative.

This brings to a close the theoretical aspect of Cairnes's treatment, and he now goes on to examine two case-studies which he believes are better explained by his theory than by the accepted one.

Case 1. The Effect of the Gold Discoveries

There is still some doubt about the means by which the nineteenth-century gold discoveries exercised their economic effects,[1] and it is interesting, therefore, to see what Cairnes made of this problem. 'Viewing the occurrences through the received theory, the judgment of economists was, I think, in general to the effect that the increased supplies of gold would have no tendency to disturb the rate of interest.' Mill, for example, based his opinion on the fact that the increased gold supplies would not have any immediate effect in altering the relation between the demand and supply of capital. But Cairnes's theoretical analysis would have suggested the question whether the new money would first fall into the hands of those liable to spend it or to lend it. Cairnes continues: 'Now in the gold countries, whither people went not to live on their income but to make money rapidly, *spending* would clearly be the rule; and in these we might accordingly have expected the rate of interest rapidly to rise and to remain constantly nearly as high as the productiveness of capital would admit . . .' and this was indeed the case in Australia and California where money on loan was scarcely to be had at all.

On the other hand, we might have expected the rates for loans to have taken an opposite course in Great Britain. The new money first reached this country through the hands of large capitalists. The rising demand in the gold countries would of course lead them to extend their operations; but meanwhile the new gold would find its way to the banks and show itself in an increase of their reserves. Even when their operations had reached the full limits of the expanding demand, still, economized as coin is in this country, the extended business would be far from absorbing the whole of this new money, which would still continue a dead weight on the loan market. This is, as you will remember, what happened. From 1852 down to the breaking out of the Russian war, the rate of interest was quite abnormally low. . . .[2]

It is quite true that the average propensity to consume would be high in the goldmining countries, while it is likely that in this country the

[1] Cf. *Economic History Review*, 1943: J. R. Hicks's review of C. Rist's *History of Monetary and Credit Theory*.

[2] The bank rate fluctuations over the relevant period are as follows:

26 Dec. 1850: 3 per cent; 1 Jan. 1852: 2½ per cent; 22 Apr. 1852: 2 per cent; 6 Jan. 1853: 2½ per cent. These rates are indeed low when compared with the rates of the late 1840's. From 1853 bank rate rose steadily to stand at 5 per cent when the Crimean War broke out in Mar. 1854.

marginal propensity to consume would be relatively low, since the new money would, as Cairnes suggested, tend to accrue to the capitalist class at least in the first instance. While the bank reserves and the supply of money on loan would increase, the demand for loans for investment would also increase but not so fast, in Cairnes's opinion. This would depress the rate of interest. This analysis may be right so far as the period 1850–2 is concerned but it is conceivable that thereafter the demand for loans increased rather more quickly than in the earlier period: and thus the effect of the gold supplies would be to prevent interest from rising as quickly as it might otherwise have done. For there is no doubt in the first place that the new gold flowed predominantly to London, creditor of the whole world at the time; and in the second, that as a direct result of the new gold, there was a considerable increase of effective demand in the country. As the effective demand extended it would tend to lessen the 'dead weight on the loan market' and the rate of interest would tend to rise. Thus Cairnes does seem to have offered a fairly convincing explanation of the process.[1]

Case 2. The Failure of a Leading Staple

Cairnes stated that when a 'leading staple' suddenly becomes scarce and trade is deranged, the rate of interest will tend to rise, but he believes that the accepted theory is incapable of explaining this. His own account runs as follows. 'The rate of interest tends to rise chiefly from a diminution in the supply of lendable money, but this tendency may be strengthened by a simultaneous increase of demand; though it is possible also that the effect of demand may be in the opposite direction; and may in some degree neutralize the tendency of the other agent in the change.' Cairnes now adopts the example of the failure of the cotton supplies on the outbreak of the American war, and argues that as a result (demand, of course, would be fairly inelastic) 'the pecuniary requirements of borrowers in cotton manufacturing will be augmented; consequently, the effect of the failure must be to increase the demand for money on loan.' Thus on the demand side of the market, the speculative and transactions motives to liquidity will be strengthened, with obvious influence on the rate of interest—this is what we should have expected in view of Cairnes's analysis above. On the supply side, 'in all circumstances, a derangement of trade from the cause supposed, indeed from any cause, would be to diminish

[1] Cairnes's argument here is amplified in his *Essays on the Gold Question* (1873) which comprised a series of essays written in the years following 1859. As Professor Hicks argues in the article quoted above, 'it can hardly be doubted that the exceptionally prolonged activity of these two boom periods was due to the steady stimulus provided by the gold fields. Further, the view that the gold acted mainly by increasing effective demand, and only to a very limited extent by lowering interest rates (more correctly, by retarding the rise in interest rates) seems wholly borne out by the facts.' *E.H.R.* 1943, p. 113.

for a considerable time the supply of lendable money. For its effect is to send us to other countries in search of the staple which has failed us in its usual field.'

Cairnes goes on to point out that for a time the trade will be carried on primarily in the precious metals, since it is not probable that a demand for the home country's produce will be forthcoming exactly to the extent of the value of the imports. Hence the balance will be made up in the transfer of gold and silver which 'must come from the stocks that are held as the disposable reserve in commercial countries. The supply of money on loan is thus diminished, and a rise in the rate of interest is the natural result.' To this Cairnes adds a footnote to the effect that the reverse is also possible though less likely—and in fact it seems to him than this was what did occur *in the early stages* of the cotton famine. Now this approach, involving as it does a studied reflection on the monetary phenomena of trade disturbances, seems a good deal more valuable than the then-existing principles, dependent on the loss of capital which such disruption may create. This latter fact may be an ultimate result but as Cairnes says 'these phenomena take their shape and character, not at all from the fact itself (i.e. the loss of capital) but from the way in which the occurrence happens to affect the pecuniary apparatus by which trade is carried on.'

Cairnes aptly summarizes his whole outlook in the following way:

> If I were asked to characterize it by a word I should say that it regards the rate of interest as essentially a '*monetary*' phenomenon; whereas it has hitherto been represented as expressing a relation of capital as distinguished from money. Monetary science, in short, as a department of political economy, resolves itself according to my notion, into two leading departments—prices and the rate of interest; or as we might describe them, the value of money in relation to commodities, *at a given time*, and its value in relation to itself *at different times*.

IV. Interest Theory in Mill's Sixth Edition

In view of Mill's statement noticed earlier, that he was entirely in agreement with Cairnes's explanation of the phenomena of interest, we might have expected a complete revision of the chapter on interest, and numerous other changes. Instead we find three significant changes only—two completely new passages (one of which has no relation to the suggestions made by Cairnes) and what Ashley wrongly explained as an expansion of the previous version: in fact it is an entirely new opinion. However, let us take the changes in order.

1. The first comprises the introduction of a paragraph and footnote at page 642 (Ashley ed.) where Mill notes two causes which had recently tended to alter the proportion of interest-receiving capitalists to profit-receiving capitalists; such changes would, he believed, be capable of altering the rate of interest 'more or less permanently'. The two changes

are firstly, the increase in gold supplies and secondly the legalization of joint-stock companies with limited liability. The passage as a whole is self-explanatory and as it bears no direct relation to Cairnes's notes, nor does it indicate any real change of opinion on Mill's part, it need only be noticed that these changes take effect through real (institutional) factors in the economy and in this partially revert to the argument of the essay of a much earlier date.

2. The second insertion involves three paragraphs at pages 644–5. The treatment up to this point, says Mill, has been in opposition to the popular notion that the rate of interest concerns only money. It will be clear from what has already been said that the view taken by Mill, while it may have been alien to that taken by financiers, bankers, &c., was not in any way opposed to the outlook of the earlier classical economists. But although the line he has taken is maintained to be predominantly correct, he is now prepared to admit a qualification. A person may borrow money, 'neither to employ it as capital nor to spend it unproductively, but to pay a previous debt. In this case, what he wants is not purchasing power, but legal tender, or something which a creditor will accept as equivalent to it. His need is specifically for money, not for commodities or capital. It is the demand arising from this cause which produces all the great and sudden fluctuations of the rate of interest.'[1]

Mill at this point has evidently succumbed to the arguments of Cairnes, though only in a limited way. He does *at this juncture* appreciate the influence of something rather like liquidity preference on the rate of interest. But Mill mentions this only in passing and it is clear that he did not rate it so highly as Cairnes.[2] He goes on at once to notice how this fits into the development of commercial crises, and finally, to all intents and purposes withdrawing his earlier admission, he concludes that 'though money alone was wanted, capital passes; and it may be said with truth that it is by an addition to loanable capital that the rise in the rate of interest is met and corrected.'[3] To complete the paradox Mill adds: 'there is a real relation, which it is indispensible to recognize, between loans and money. Loanable capital is all of it in the form of money. Capital destined directly for production exists in many forms; but capital destined for lending exists normally in that form alone.'[4] If Mill had really accepted the Cairnes approach, he could not consistently have admitted that loanable capital was composed solely of money, and yet uphold the traditional doctrine. There is no sign that Mill wholeheartedly accepted Cairnes's teaching; instead, he seems to waver between the alternatives, in the end choosing

[1] *Principles*, p. 644.

[2] It is noticeable that Mill adopts the very argument rejected by Cairnes, concerning the 'redirection' of existing capital. Cf. ibid., p. 644, para. 1, and p. 73 *supra*.

[3] Ibid., p. 645.

[4] Ibid., p. 645.

neither but compromising to such an extent that he leaves himself in a vulnerable and somewhat unhappy position. It may even be doubted whether Mill correctly understood the import of Cairnes's argument though probably this is going too far; it would be nearer the truth to say that although Mill was prepared to admit a certain amount of truth in the monetary approach, he continued to stress as more important the capital-interest relationship.

3. This becomes increasingly apparent as we go on to what Ashley called 'an expansion' of two earlier paragraphs, and the comparison between the old and new versions makes interesting reading. Mill had previously argued that only in the case where the currency depreciation was believed to be temporary would an increase in the money-supply be capable of affecting interest. Now in the sixth edition he rephrases his opinion: 'the permanent amount of the circulating medium, whether great or small, affects only prices; not the rate of interest. A depreciation of the currency, *when it has become an established fact*, affects the rate of interest in no manner whatsoever.'[1] But Mill goes on to admit that although 'the greater or less quantity of money makes in itself no difference in the rate of interest, a change from a less quantity to a greater, or from a greater to a less, may and does make a difference in it.'[2] The original proposition is still true for the long run, when all the consequences have had time to work out their full effects, but Mill is now willing to admit short-run deviations from the principle, and Cairnes's teaching has evidently been successful at this point. What then of the possibility of a *permanent* alteration in the level of interest through this mechanism? Mill first adopts the distinction made by Cairnes between the alternative uses of money-spending or lending. If now the government issues a certain amount of inconvertible currency for some reason, this, says Mill,

> will in no way diminish the demand for real capital on loan; but it will diminish the real capital loanable, because, *this existing only in the form of money*, the increase of quantity depreciates it. Estimated in capital, the amount offered is less, while the amount required is the same as before. Estimated in currency, the amount offered is only the same as before, while the amount required, owing to the rise in prices, is greater. Either way, the rate of interest must rise.[3]

Given, then, the fact that depreciation, while in progress, tends to raise the interest level, and as Mill adds, that the expectation of further depreciation reinforces this tendency, we find that Mill's analysis of this side of the picture is comparable with that of Cairnes at the same point (cf. p. 77 *supra*). On the question of the mechanism when the money-supply takes effect from banking loans, Mill argues that an increase in the currency by this means will necessarily involve an addition to loans,

[1] Ibid., p. 645. My italics.
[2] Ibid., p. 645.
[3] Ibid., p. 646. Again my italics.

causing the rate of interest to fall. Similarly, when gold discoveries cause an increase in the money-supply, this is nearly all added to deposits in the banks, 'and consequently to the amount of loans; and when drawn out and invested in securities, liberates an equivalent amount of other loanable capital.'[1] Again the effect is a lowering of interest. In both cases then, the analysis suggested by Cairnes seems to have been accepted by Mill. The monetary, as opposed to the capital, property of loanable funds is given some emphasis, at least in the short run. Thus Mills concludes: 'The rate of interest, then, depends essentially and permanently on the comparative amount of real capital offered and demanded in the way of loan; but it is subject to temporary disturbances of various sorts from increase and diminution of the circulating medium. . . .'[2]

Yet Mill still appears to cling to the idea of the long-run invariability of the interest-profit relationship. Once the short-run influences have worked their way through the economy, the same *relative* prices, profit and interest-rates will be found to prevail; that is, unless at the same time any *real* changes take place. Now in the *Principles* the only change of this kind which Mill admits is that of the possible effect of alterations in the money-supply so far as they alter the distribution of wealth between the two capitalist groups of interest- and profit-receivers; and the counteracting tendency of the institutional change, the legalization of limited liability. But in the *Unsettled Questions* Mill had allowed for other influences, such as that caused by an increase in inconvertible currency through the banking system—precisely the case which in the sixth edition he treats as having only intermediate effects. The more general idea behind the argument here seems to be that while at the early stage Mill was prepared to admit that monetary or banking policies could have a determining influence on the long-run equilibrium level of business activity, and hence on output and employment, he now in the sixth edition allows only that institutional changes, and not monetary policies, are capable of influencing the long run, during which the consequences of the added injection of loans will have time to work themselves out.

Cairnes, as observed above, had maintained that the banks by increasing currency could influence the aggregate amount of capital in the country, but this had evidently not been approved by Mill, since in effect this implied that changes in bank holdings and the rate of interest, reflecting changes in monetary policy, *were capable of* influencing the long-run equilibrium of employment and production, even though they did not affect the 'institutional' factors permitted by Mill. In fact Cairnes does not introduce these (nor forced saving) and they are Mill's own contribution. Thus Mills, despite his statement that he entirely agreed with

[1] *Principles*, p. 647. [2] Ibid., p. 647.

Cairnes's explanation of interest, has not accepted that explanation with all its consequences; and in adopting portions only of the latter's theory, he has been unable to present the matter as convincingly as possible.

It would be interesting to see the effects of this theory of Cairnes on the rest of Mill's economic analysis had he accepted it in full, but this is obviously impossible here. As an example, however, I may suggest very briefly how the wages-fund doctrine would have been affected.

According to Mill, the general wage-rate cannot rise unless there is either an increase in the aggregate funds employed in hiring labour, or a fall in the number of labourers for hire. This was a long-term doctrine and wages in individual employments could 'ebb and flow' from time to time. Two influences were admitted to be operative on the size of the wages-fund which was capable of variation in the long run but considered as predetermined at any given time. The aggregate sum to be devoted to the employment of labour could be increased by additional saving and by the progressive accumulation of capital, so that as gross capital increased, the total sum available for wages also increased; an addition to gross capital was generally considered to be divided proportionally between technological- and wage-capital. Mill was well aware that fluctuations in output and employment were related to changes in the credit-supply but tended to argue that it was *because* it was expected to be profitable to extend operations that credit was in the first place required and in the second, supplied. Cairnes, however, allows for the possibility that an increased supply of credit, from whatever source, *would* affect the rate of interest and the supply of loans. And further, he argued that it would in some way increase the national capital, and so presumably output and employment. This would have been patently fatal to the doctrine of the wages-fund for it would have meant that purely monetary factors, operating through the monetary policies either of the banks or of government, would be capable of affecting the size of the wages-fund, with obvious inferences for the level and stability of the long-run equilibrium of employment.

If Mill realized this, it seems plausible to say that he would not attempt to incorporate the full implications of Cairnes's suggestions into the new edition. For in the first place his time was limited, and in the second he was characteristically unwilling to put anything into print which had not yet been fully worked out. We see an example of this in his references to the contemporary discussion of value theory and the wages-fund doctrine in the Preface to the seventh edition of the *Principles*.

Above all, the *Principles* is from many points of view a conservative work, including as it did nothing which Mill believed to be in any way dubious. Thus, even though he may have realized the possible qualifications

which perhaps ought to have been made to certain parts of his exposition, he would be unwilling to make alterations until they had been fully justified and were capable, in his estimation, of adequate explanation. The *Principles* in fact seems to present not so much Mill's own views on political economy—although it is inevitable that they should intrude in places—as an exposition of those parts of the subject which were considered to be beyond all doubt and completely established. This is reflected by his, at times, forced retention of Ricardian principles when his own opinion seems to be drawing him in another direction. But the Ricardian influence perhaps had an importance of its own, in that Mill believed that his task was to expand and expound the economics of his father and Ricardo. This is no doubt true of the theory of interest where, as we have seen, it is possible only to reconcile Mill's admitted acceptance of Cairnes's theory with the version given in the sixth edition of the *Principles* by the presumption that Mill was trying to maintain, as far as possible, the Ricardian formulation and was unwilling to admit any radical inaccuracies in that approach. In the present instance Mill tried—or so it would appear—to integrate the Cairnes and Ricardian approaches by admitting into his analysis what amounted to no more than 'patches' of the former's theory; and in this attempt he failed to allow fully either for the implications of Cairnes's explanation, or for the possible clash between the latter and the abstract logic of the master, Ricardo.

In postscript, one final comment may be made. In the 1870's Cairnes published his three main economic works, of which *Some Leading Principles of Political Economy Newly Expounded* (1874) was probably the most important. Yet nowhere in this book does Cairnes revert to his earlier discussion of the rate of interest, despite the wide range of topics considered. (He does deal briefly with abstinence, but only as a factor of production and not in relation to interest.) In his *Essays in Political Economy* (1873), however, discussion does cover some of the subjects raised in the notes; these are not *directly* related to the question of interest, but to the effect of the increased gold supplies on prices of different classes of goods. In any case the essays on the gold question were originally written prior to 1865, and we should probably say that the essays were the source of the notes, rather than vice versa. This is indeed a curious situation for it would seem to suggest that Cairnes was satisfied with the presentation of interest theory in Mill's *Principles*—a view which is hard to reconcile with our reading of the former's notes. On the contrary, Cairnes might have been expected to be a little unhappy about the results of Mill's 'compromise': on the above evidence he could hardly have been blamed for welcoming an opportunity to express in print his own rather novel opinions on interest theory. That he did not do so could be explained

either by a change of opinion on his part (though this seems highly improbable, for he was adamant in his emphasis of the money-interest as opposed to the capital-interest relationship) or by a belief that Mill had fairly presented the essential arguments of the notes (again this seems unlikely, for obvious enough reasons). Cairnes's chronic ill-health apart, I can offer no further explanation of this omission.

THE THEORY OF PUBLIC UTILITY PRICE: A FURTHER NOTE

By J. WISEMAN

In his article 'In Defence of Public Utility Price Theory'[1] Mr. Farrell has taken objection to three recent criticisms of the pricing 'rules' derived by economists from Paretian-type welfare economics.[2] Although two of the three contributions with which Mr. Farrell concerns himself deal with wider issues, his own discussion is confined for the most part to the theory of public utility price. This was the subject of my own paper: the following notes are therefore offered by way of further comment.

I. The Theoretical Issues

In a further note of this kind, it is usually most satisfying to itemize the specific issues upon which disagreement arises, and comment upon them. This is unfortunately not easy to do in the present case, for two reasons. First, Mr. Farrell discusses three distinct sets of arguments, by different writers, in his own one paper. The result is that he is driven to present the views of individual writers (including my own) in so simplified a form that useful further comment becomes impossible without some restatement of the initial argument. Second, Mr. Farrell's discussion, as we shall see, shifts between issues of logic and of judgement in a way that makes ordered comment difficult.

In these circumstances, it seems best to follow the general order of Mr. Farrell's own argument, while concentrating primarily upon the implications of that argument for my own position.

1. The 'Empty Box'

Mr. Farrell's argument begins with a summary of my own objections to the public utility pricing rules in four 'points', with the addition of a fifth (that the marginal cost 'rule' for public utilities depends upon the fulfilment of the optimum conditions elsewhere) which I did not make but which is offered *gratis*. This last point can be disposed of at once. The argument is well known and I do not object to it: simply, it did not fall within my own terms of reference, although the other writers under discussion were no doubt concerned with it.[3] The other 'points' require some elucidation.

Point (1), as given by Farrell, is that 'It will usually be only in the short

[1] *Oxford Economic Papers*, Feb. 1957.

[2] J. Wiseman, 'The Theory of Public Utility Price—An Empty Box', ibid., R. G.Lipsey and R. K. Lancaster, 'The General Theory of the Second Best', *Review of Economic Studies*, vol. xxiv, No. 1; J. de V. Graaff, *Theoretical WelfareEconomics*, Cambridge, 1957.

[3] Nor do I believe, as Mr. Farrell hints, that the rule of pricing at average cost 'has more

run that average cost exceeds marginal, and in this case the magnitude of marginal cost depends upon the (arbitrary) definition of the length of the "short run".' This statement gives a misleading impression of my actual argument. This is that the difference between marginal cost and average cost, to which public utility theorists direct attention, can only arise because of the existence of technical or temporal indivisibility. Now, such indivisibility is present in greater or lesser degree in all productive processes. This does not affect the Paretian 'optimum' conditions, as usually stated, since the welfare criteria relate to a notional long-run competitive equilibrium situation. But it does affect the argument for pricing public utility products at marginal cost, since it means that the idea of a divergence of marginal and average cost can only be sustained by treating the appropriate time-period for considerations of pricing policy as being shorter than the lowest common multiple of the economic life of all the assets of the public utility concerned. The question then arises: what is the 'right' time-period for this purpose, since the choice of a time-period is in effect the choice of a price? The postulates of welfare economics give no guidance in this matter. It is not a question of what the 'usual' short-run relationship between average and marginal cost might be, but of whether these terms have any clear meaning. It will be noted that my argument does not depend in any way upon whether indivisibility results (in some sense) in average cost being above or below marginal cost. Indeed, it should be clear that such a statement is difficult to interpret: the relation between marginal and average cost must depend upon the time-period chosen, which determines what is treated as marginal cost. Consequently, although in my earlier paper I consider cases in which the time-period chosen and the conditions of production are such that marginal cost is less than average cost, so that subsidies are needed, the validity of the propositions there made in no way depends upon this limitation. My concern is with the nature of costs, and with the fact that the precise nature of the marginal cost 'rule' must remain unclear until some satisfactory solution to the time-period problem is provided.

It is of interest to observe that Mr. Farrell does acknowledge the existence of these problems of time and indivisibility later in his article, though only in an incidental fashion and in a different context. Thus, when discussing incidental issues raised by Graaff, he says (in a footnote): 'There is, of course, a whole spectrum of marginal costs corresponding to the possible definitions of the short run. It is however convenient to talk as if there were only one.'[1] It may be convenient, but it is also wrong, and

to be said for it'. I have nowhere said that I do, and my argument is not open to such an interpretation.

[1] p. 115, n. 3. The way Mr. Farrell gets rid of the indivisibility problem (p. 116) is similar

grossly misleading; if we are to continue to discuss public utility price as a special case, we need to know which marginal cost is relevant, and why.

I turn now to the second 'point' of Mr. Farrell's summary. This is that deficits resulting from pricing at less than average cost have to be covered, and that all the proposed methods of raising the necessary funds are open to objection. As a very summary statement of my own position, the formulation of this particular proposition is not unsatisfactory. But the same cannot be said of the commentary upon it. Once again, the important discussion is to be found in a footnote (p. 100, n. 1). There, Mr. Farrell suggests that, for at least some of the pricing policies under discussion, the validity of the argument depends more upon the practical difficulties of measuring consumer's surpluses than upon the theoretical weakness of the pricing 'rules'. But the introduction of these practical considerations, important though they may be, is an irrelevance so far as my own argument is concerned. My concern at this stage is simply (and explicitly) with the theoretical issues.[1] All that Mr. Farrell has to say about these is that 'one would be reluctant to lean very heavily on Mr. Wiseman's theoretical objections'. As to why, he offers one single illustration, concerned with my discussion of the 'club' principle. This I am not sure that I understand; I will therefore content myself with a brief restatement of my own position in the hope of providing clarification. In my view, the essential point about the 'club' principle is that it implies a redistribution of real income. The justification offered for this is that consumers 'voluntarily' choose this redistribution rather than go without the product, so that their 'economic welfare' must be improved by use of the 'club' principle. But this raises the question of the meaning of an act of voluntary choice, and it is in this context, and not in the context indicated by Mr. Farrell, that the comparison of a perfectly discriminating monopolist and a public utility 'club' is relevant. This is made clear in the whole section of my paper (pp. 66–68) devoted to this one issue. Mr. Farrell makes no reference to the argument of the relevant section, although the quotation he gives comes from it, any more than he makes reference to the importance of considerations of income-redistribution in this particular context, despite the fact that he devotes one section of his own paper to discussion of income-distribution alone.

In these circumstances, I cannot take Mr. Farrell's objection to my theoretical criticisms of the proposals for financing the deficits caused by marginal cost pricing very seriously. He raises only one specific objection, and that is without importance.

enough to be noteworthy. His argument is applied to commodities. If he applied it to factors, as my own article attempted to apply a similar argument, he would be driven to question the *raison d'être* of the separate theory of public utility price.

[1] See my n. 1, p. 51.

The last two 'points' given by Mr. Farrell concern the problems of uncertainty and the need for a return to be earned for the economic function of risk-bearing. I will not discuss these at length, as they do not enter greatly into Mr. Farrell's argument, but will limit myself to the observation that my own discussion of uncertainty (Section III, pp. 68–72) is concerned with the consequences of its introduction into the welfare model for the meaning of costs in general and of cost 'rules' in particular. This is a natural development of my earlier consideration of the nature of costs in the usual welfare analysis; uncertainty raises significant new problems of interpretation. The issue is complex, but, following his usual procedure, Mr. Farrell reduces it to his own over-simple conceptions and terminology in the two 'points' that 'criteria of efficient administration' (*sic*) are more difficult to apply in an organization that does not cover its costs, and that since capital is raised on gilt-edged terms 'marginal cost would represent too low a price' for public utility products. This is not a very adequate summary. Indeed, Mr. Farrell gives little further attention to the group of problems concerned. In his only direct reference, he says: 'There remain the inter-related problems of time-discount and risk-discount, which may be thought of in terms of a two-dimensional array of rates of interest. [It is a useful piece of shorthand to refer to this array as 'the rate of interest'] . . . in any particular situation a rate will rule in the rest of the economy and it seems unlikely that the constrained optimum . . . will involve applying a different rate to public utilities' (p. 117). Once again, the problem is got rid of by assuming it away: differences in durability, uncertainty, &c., in different venues of production, which would be reflected in differences in rates of return and in factor-use over the private sector of the economy, become irrelevant to the public utility problem because we can use 'the' rate provided by our 'useful piece of shorthand'. But does Mr. Farrell really believe that all public utilities are engaged in ventures of equal riskiness, or that any differences in this respect are irrelevant for the achievement of his 'constrained optimum'?

Before leaving the discussion of Mr. Farrell's comments upon my own article, a word must be said about methodology. This is also a topic for discussion in the second part of this paper: my present interest is in the single question of necessity and sufficiency, which Mr. Farrell thinks very relevant to the interpretation of my own conclusions. After offering an explanation of the nature of necessary and sufficient conditions, he suggests that my own arguments should lead to the conclusion that the marginal cost 'rule' provides a necessary but not a sufficient condition for optimum resource-allocation; in his view, it is still the case that 'the rule that a public utility should never set its price below marginal cost has much

to commend it'.[1] With great respect, no such interpretation of my argument is plausible. Briefly, statements such as the one quoted can have meaning only in terms of some stated time-period, and the welfare analysis gives us no guidance in the selection of the appropriate period. As a result, the marginal cost rule, and Farrell's own proposition, both have no clear meaning as they stand. This is not a matter of necessary and sufficient conditions, but a question of clarity of meaning; I therefore stand by my assertion that 'the welfare criteria give rise to no unambiguous general rule for the price and output policy of public utilities'.

2. The Second Best

The arguments put forward in the article by Lipsey and Lancaster,[2] which is the subject-matter of this section of Mr. Farrell's discussion, are in my view convincing, as is their general conclusion that a disturbance of the optimum conditions in any one market makes it impossible to say, in any particular case, what relationship between price and costs will best satisfy the welfare criteria in any other market. Nevertheless, I find it difficult to comment satisfactorily upon Mr. Farrell's discussion, since his argument seems to me to stand in need of clarification. If I understand his point, Mr. Farrell does not argue that the *logic* of the 'second best' propositions is defective. Rather, he believes that the sweeping nature of the conclusions reached by Lipsey and Lancaster is the consequence of the authors assuming that 'either the taxed commodity, or the commodity whose optimal price is in question, or both, are close substitutes for money' (p. 112). How is this statement to be interpreted? The whole welfare analysis is concerned with the operation of markets, and with relative valuations expressed in money terms. Things which cannot be traded (i.e. exchanged for money) do not enter into consideration. Thus, the short answer to Mr. Farrell would seem to be that *all* the goods in which the writers he criticizes are interested are substitutes for money. It is even more difficult to be sure what Mr. Farrell means by a 'close' substitute for money. Is it simply a good for which market demand is elastic around ruling prices? If so, why not say so directly? Or is it a good that is readily exchanged for money at any time, and vice versa? Or what?

Given these difficulties of interpretation, the rest of Mr. Farrell's argument is inevitably obscure, since it amounts to an examination of the effects upon the Lipsey/Lancaster conclusions of making the 'reasonable assump-

[1] p. 111. This is the new Public Utility 'box'. The wording is noteworthy. It does not suggest that the proposition follows definitively from a set of theoretical arguments, but only that it has 'much to commend it'. Such statements, shifting the argument between matters of logic and matters of judgement, are typical of Mr. Farrell's method.

[2] Op. cit. The authors have read this section of the paper; its argument accords broadly with their own conclusions.

tion' that the goods to be examined are *not* close substitutes for money. But although I find myself unable to follow the argument as it stands, one thing about it is quite clear. Even with his modifications, Mr. Farrell can still not derive a general rule—either of the type proposed in the past or of his own 'necessary but not sufficient' kind—from the logic of his economic analysis. Rather, he suggests that the 'second best' argument 'does not seem likely to limit the application of the [Farrell] rule very severely' because there would probably be fewer cases in which the 'right' price should be below marginal cost than cases in which it should be above. But these are matters of fact and of judgement, not of analysis or of logic.[1] Either pricing 'rules' can be derived from the relevant theory or they can not. Mr. Farrell seems to believe that they can not, but that we should go on talking as though they could, and this seems to me akin to the proposition about the barmaid's baby.

3. The Redistribution of Income

The effects of policies such as marginal cost pricing on the distribution of income, and the consequences of these effects for the logic of the pricing 'rules', are considered by all the writers discussed by Mr. Farrell. His own remarks, however, concentrate upon the discussion by Graaff; I shall consider such parts of them as are germane to the issues of public utility pricing.[2] The essence of Mr. Farrell's argument is to be found in the first paragraph of the relevant section of his paper: 'The Pareto conditions are necessary but not sufficient: for an optimum one must choose between all those positions satisfying the Pareto conditions that which has the "best" distribution of income. . . . Any redistribution of income must be accompanied by a change in prices, not in breach of the Pareto conditions, but so as to maintain them' (p. 113).

From the point of view of the theory of public utility price, the second sentence appears to stand the logic of the problem on its head. The discussion is concerned with the discovery of a 'rule' by which the prices of public utility products might be decided. The position of the critics is that no rule has been proposed which does not affect the distribution of income. Consequently, adoption of any one of the rules implies a decision about pricing policy *and a simultaneous decision about income distribution.* Now the Paretian conditions are concerned with the logic of choice, technically defined. They are *not* concerned with the distribution of income, and therefore provide no guidance as to why one distribution should be preferred to another. Neither does Mr. Farrell, *pace* the above quotation; he

[1] Cf. n. 1, p. 96.

[2] I have already pointed out that Mr. Farrell makes no attempt to comment directly upon my own discussion of the implications of particular public utility pricing rules for the distribution of income.

says we must choose between income distributions, but neglects to tell us how to do so. To say that the Pareto conditions are necessary but not sufficient is simply to evade the issue. The point is that *a decision about a public utility price is also a decision about the distribution of income*, and the Paretian conditions cannot tell us what decision 'should' be taken about the latter. Consequently, any price for a public utility product is as capable (or incapable) of justification as any other. A government may feel, for example, that the 'best' distribution of income is encouraged by giving the product away, and that this more than compensates for any failure to relate prices to costs.

The one paragraph referred to is all that Mr. Farrell has to say about income-distribution at the level of pure theory: he turns thereafter to what he calls the *practical* difficulties of redistributing income. The discussion of these, here and in the appendix to this section, involves an impressive, even startling list of assertions about the incidence and effects of taxes, subsidies, &c. These include, *inter alia*, a resurrection of that ancient friend, the superiority of lump-sum taxes to other types, and a suggestion that 'objective criteria of need' are readily available for the utilization and assessment of subsidies to persons. Mr. Farrell cites widows and children as illustrations of this latter point: does he believe all widows and parents to have the same incomes and responsibilities?

Further iteration would be tedious: anyone interested enough need only turn to the relevant section (pp. 114–15) and the appendix (pp. 121–2) of Mr. Farrell's article. Both here and elsewhere in his text, Mr. Farrell's willingness to make the judgements he does as to what are the 'best' kinds of taxes, subsidies, &c., for the fulfilment of the Pareto conditions suggests that he must have solved the problems of the general and particular incidence of taxation which have plagued so many of us for so long, and which have stimulated (for example) the critical writing referred to on page 58 (n. 2) of my earlier article.

II. The Farrell 'Box' and Economic Policy

It has, I hope, already been amply demonstrated that from a theoretical viewpoint Mr. Farrell's new economic box—the maxim that 'a public utility should never set its price below marginal cost'—is as empty as the earlier ones. However, it is useful to summarize the arguments, as the basis for a short discussion of the problems of economic policy. The easiest way to do this is by returning to the beginning of Farrell's article (pp. 110–11) in order to examine how the box was manufactured in the first place. We find that his maxim is first introduced by arguing that my own discussion examines in detail only cases of decreasing average cost. If on the other hand costs are increasing, Farrell believes that most of the objections I

raise disappear, and the new 'rule' comes into its own. Two things need to be noted at once. First, the initial proposition does not hold, since my objections are not restricted to the cases Farrell indicates.[1] Indeed, in relation to my own exposition arguments of the kind he uses make little sense: Mr. Farrell is only able to introduce his 'rule' by reverting to the terminological obscurities which it was one of my aims to destroy, and which have generated so much of the past confusion about pricing 'rules'. Second, this limitation apart, Farrell's own argument would seem to restrict his 'rule' to cases of increasing average cost. This is not made explicit, although how the 'rule' is to be generalized to cover decreasing average cost cases is nowhere explained, but appears simply to be assumed. The particular argument for the increasing-cost industries *per se* is itself not very satisfactory. To price at average cost (not a thing I myself advocated as the 'right' policy in any circumstances) in such conditions would, he says, be to distribute the 'economic rent' earned by the utility as a subsidy, which would be 'arbitrary in the extreme'. This is confusing until one realizes that it is not an actual subsidy to meet a deficit that Mr. Farrell has in mind, but simply that consumers will pay less for a product (and so be 'subsidized') if they are only required to cover the actual costs of producing it than if required to pay more than this. But why it must *necessarily* be wrong for consumers of a public utility product to be enabled to consume at a price that will cover all production costs is far from clear.

From this point on, the theoretical validity of Mr. Farrell's 'rule' is open to further question at each successive stage of his discussion. We find, for example, that the new 'rule' does not hold generally in the light of the 'second best' argument, it does not explain satisfactorily how the income distribution problem is to be solved, it does not explain what degree of 'indivisibility' is necessary to make the new 'rule' relevant, and it does not explain how the problems raised by risk and uncertainty are to be taken care of.

In the light of all this, it might seem that the discussion could now close, the reader being left to judge the relative validity of the positions taken by Mr. Farrell and by those he criticizes. But there is another question, bearing upon the relationship between economic theory and economic policy, which Mr. Farrell makes much of and which has important practical implications. Mr. Farrell does not pretend that his 'law' is of universal validity, as the earlier public utility 'laws' were once believed to be by their supporters.[2] This is not to suggest, of course, that he would accept

[1] See above, pp. 89–90.

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all the criticisms I have been making of his logic. But his own discussion constantly throws up instances where the 'law' might not hold. These are not denied. Rather, Mr. Farrell accepts them at the *logical* level, but seeks to minimize their *practical* importance, as the alternative to abandoning his position entirely. Thus, his 'rule' is introduced in the first place simply as having 'much to commend it'. The 'second best' argument is not refuted but 'does not seem likely to limit the application of the "rule" very severely'. 'Likely' is indeed Mr. Farrell's favourite word: it also dominates his discussion of income-distribution—the effects of taxes, &c., are considered in terms of 'likelihoods' and on the basis of the discussion the conclusion is reached that it is 'unlikely' that considerations of income distribution should lead to optimal prices below marginal cost.

The justifications given for this procedure are concerned with the nature of economic policy. About this, Farrell argues first, that policy rules cannot be expected to hold with logical certainty,[1] and second, that such rules should not be tested against a theoretical criterion but against the available alternatives. It is at this level that Mr. Farrell believes that his 'rule' can be supported. However, while it is easy to sympathize with Mr. Farrell's desire to solve practical problems, the logical criticisms with which he has (unsuccessfully) tried to deal cannot be dismissed, as he wishes to discuss them, as 'facile de-bunking'. They demonstrate the logic of the theory of public utility price to be *fundamentally* unsatisfactory, and Mr. Farrell's article does nothing to change this. If the logic is fallacious, it cannot be used to justify policy decisions, even if the value judgements of the policy makers and those of the analysis are identical. Nor can Mr. Farrell's second proposition be used to redeem the situation, since the 'rules' provide us with insufficient criteria by which to assess one policy proposal against another.

In conclusion, I would like to suggest that, whatever our differences from other points of view, Mr. Farrell's approach to the problems of current policy does not differ radically from my own. It is true that, as Mr. Farrell says, I want to 'consider each utility individually'. But I also suggest (as he does not say) a specific set of issues that my discussion indicates to be relevant to all decisions about public utility pricing policy: these might act as a general directive for a policy-making body. Mr. Farrell, in contrast, insists upon the need for a general 'rule', even though exceptions to it must be admitted. But when he comments upon the policies he believes currently suitable for particular products (pp. 117–20) a rather different picture emerges. Mr. Farrell comments on four products. For one of these, *electricity*, he merely quotes Professor Houthakker's findings;

[1] Though Mr. Farrell's explanation of this point indicates a confusion of problems of logic and problems of agreement about judgements of value.

I shall therefore not discuss this further. In the case of *coal* he believes the problems of discovering 'right' prices to present no very difficult problem other than that of transportation cost, though he does not explain how he would justify treating any particular figure as *the* 'marginal cost' of coal. *Roads* present more difficulty; he advocates taxes, partly as an approximation to wear and tear, partly to reduce congestion (what is the 'optimum' degree of congestion?), partly to reflect the 'opportunity-costs' of street parking. In the final instance of *housing*, he argues that there may be a case for subsidization because this is a market in which 'paternalism' may be reasonable. But the size of the subsidy 'should be determined explicitly, as a value judgement based upon accurate knowledge of the situation'.[1]

Mr. Farrell may call this industry-by-industry study marginal cost pricing if he wishes, though I hope that the label will not mislead anyone. To me, it looks awfully like that 'consideration of each case on its merits' which he condemns when put forward by others.

LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE.

[1] Farrell, p. 119. The discussion of this market provides perhaps the classic instance of Mr. Farrell's juggling with theory, value judgements, and policy propositions. His argument amounts to this: Generally, paternalism is disliked. But there are stronger arguments for it in housing than elsewhere. 'It may thus be optimal to subsidize the consumption of housing by some or all families.' What does 'optimal' mean here? It cannot mean optimal in terms of the welfare criteria, at least as normally defined. If not, can it mean anything except 'Farrell thinks this would be the best thing?' I myself greatly dislike the idea of subsidizing housing for paternalistic reasons: is Mr. Farrell's subsidy 'optimal' for me?

PRICE AND QUOTA AGREEMENTS: THEIR EFFECT ON THE QUALITY OF RUBBER-INSULATED CABLE

By K. GROSSFIELD

In recent years the Government has acted vigorously against restrictive practices. The conflict between opponents and supporters of these practices has sharpened and public interest in the controversy has grown.

Opponents of restrictive practices believe that competition stimulates manufacturers to supply the wants of purchasers; that purchasers can best satisfy their needs when they can choose freely products of competing firms.

Supporters of price and quota agreements claim that these agreements safeguard quality because excessive competition encourages quality adulteration—the sale of products of lower quality than desired by purchasers. This view, known as the quality argument, is not generally accepted.

A recent study of the rubber cable industry[1] shows that in the early 1900's price and quota agreements proved a better defence than competition against quality adulteration. This case is of some general interest as it illustrates the various aspects of the quality argument.

Poor quality was produced because competing manufacturers could use cheap inferior insulating materials and sell it successfully as a reliable product. Established trade relations, which frequently offer a guarantee of quality, had not had time to develop because many new-comers, both cable makers and cable users, had only recently joined the electrical industry.

High-quality production was encouraged by subsequent price and quota agreements, because such agreements required the manufacture of comparable good quality products by all member firms. Experience in the competitive markets in Germany and the U.S.A. supports the view that, at that time, price and quota agreements were the most effective means of improving quality.

The Product

Cables and wires for the transmission of electricity consisted of a conductor embedded in insulating material which in turn was frequently protected by a sheath. Two principal types of cable could be distinguished:

[1] The Interaction of Scientific, Technical and Economic Factors in the Cable Industry, 1956. K. Grossfield, M.Sc. Thesis, London University.

mains cable which connected the consumers' premises to the generating plant, and small cables which linked the various electrical appliances to the main. Rubber compounds proved uniquely suitable for flexible cables used within buildings; for mains cable, not only rubber but also other insulations such as paper or bitumen were used.

Rubber insulation consisted of a mixture of rubber and a number of other materials known collectively as fillers. These materials included zinc oxide, French chalk, plaster of Paris, ceresine, sulphur, and others, and used in moderate quantities improved the mechanical properties of the insulation, but in excess reduced its working life. A good insulation contained about 50 per cent. rubber, quality declining with decreasing rubber content. A skilfully mixed compound of lower rubber content could, however, prove superior to a less skilfully produced compound having a higher rubber content.

The most important purchasers were the electrical supply authorities who brought chiefly mains cable, and electrical contractors, who were responsible for internal wiring of buildings.

The Failure of Competition in Safeguarding Quality

Manufacturers could greatly reduce costs by lowering the percentage of rubber in the insulation as shown in Table I.

TABLE I

Total Cost of Two Sizes of Cables Using an Insulation Containing Differing Percentages of Rubber

Size of cross-sectional area of conductor	*12·5 mm.*			*0·66 mm.*		
Rubber content of insulation compound (by weight)	28%	40%	55%	28%	40%	55%
Total cost of cable in shillings per km.	490	564	651	80	95	112

D. Coyle and F. S. O. Howe, *Electric Cables, Their Construction and Cost.* London, 1909.

The data is based on a typical market price for high quality rubber at that time. A rubber content lower than 28 per cent. would have further reduced production costs.

Makers could also purchase cheap rubbers because rubbers differed markedly in price and quality. (In 1905 practically all rubber was obtained from wild trees, in 1920 approximately 90 per cent. came from plantations.)

Best quality cost nearly double[1] that of inferior types. Consequently during the early 1900's makers could greatly reduce expenses by using either inferior rubbers or an insulation of low rubber content.

Purchasers could not adequately test rubber insulation. It is notoriously difficult to analyse complex organic compounds which have passed through a manufacturing process. The development of quality tests required a great deal of research and it was only in 1909 that quality tests really useful to purchasers were published. These tests had been developed in Germany where conditions were exceptionally favourable to research on quality control. Around 1900 users were quite unable to determine quality at the time of purchase.

Equally important, poor insulation would usually fail not immediately after sale, but only after perhaps six months or a year or even two years of service. Failure could have been due to accidents, or to mishandling during installation (cables and wires were not usually laid by makers), or to misuse by the owner of the installation. Quality was only one among a number of factors liable to cause failure and even the best insulation would break down when exposed to moisture, alternating wet and dry conditions, or chemical attack. On the other hand, in favourable conditions, for instance in perfectly dry surroundings, even the poorest insulation would give adequate service.[2] For these reasons users could rarely prove that poor quality had been responsible for failure.

Quality evaluation would have been facilitated if manufacturers had stated the composition of their insulation. But this the makers were unwilling to do partly for technical and partly for commercial reasons.

Technically a bare statement of the composition of the insulation would have been misleading because quality depended on skill in mixing the ingredients, as well as on the materials used. The commercial reasons, however, were of greater importance.

At that time little was known about the manufacture of rubber insulation, which became important only with the growth of the electricity supply industry from the 1880's onwards. 'The recipes of rubber insulation had originally come from Silvertown (i.e. The India Rubber, Gutta Percha and Telegraph Company) and were brought to other works by foremen. These (recipes) were modified as the works gained experience.'[3] By about 1900 every firm had developed its own particular compound. Its composition was treated as a closely guarded secret because know-how of successfully mixing rubber compounds was of great commercial value, but could not be adequately protected by patents.[4] Consequently makers were unwilling

[1] D. Coyle and F. S. O. Howe, *Electric Cables, Their Construction and Cost*, London, 1909.
[2] H. M. Leaf, *The Internal Wiring of Buildings*. London, A. Constable & Co., 1903.
[3] *Electrical Review*, 1903, vol. lii, p. 862.
[4] Ibid., 1902, vol. l, p. 89.

to state the composition of their insulation and purchasers remained ignorant of its quality.

A discussion at one of the meetings of electrical contractors, who were chiefly concerned with internal wiring of buildings, illustrates the general inability to determine quality.

> The keynote of the lengthy discussion of the members of the Electrical Contractors Association on rubber and other materials used in cables and wires, was the fact that their purchases of rubber-covered cables were not based on knowledge of the actual properties of the materials supplied, but on the assurances of the seller. . . . Therefore as more than one speaker observed, purchases were made on faith in manufacturers' assurances and guarantees.[1]

Unfortunately purchasers could not rely on the reputation of the suppliers as a safeguard against quality adulteration. Many new firms had joined the electrical industry encouraged by the rapid growth of electric lighting around 1900—the number of electric lamps in use had grown from about 2 million in 1896 to 13 million in 1903[2]—and in particular by the expansion of the supply systems into new areas. Consequently, many contractors knew little about cable firms and lacked the guarantee of quality inherent in long established trade relations with makers. Similarly the absence of established trade relations may have tempted newly established cable makers to adulterate quality.

Evidence shows that quality adulteration occurred. The most outstanding example is described in the case of *Foote and Milne* v. *The St. Helens Cable Co.* In 1903 Foote and Milne sued the St. Helens Cable Company for damages arising through the supply of inferior rubber-insulated cables.[3]

> The plaintiffs, who started to trade in February 1900, had bought from the defendants large quantities of vulcanised rubber cable and had relied on the warranties issued by the defendants. The plaintiff stated that the inducement to trade with the St. Helens Cable Company was the reasonable price of their cable, and he admitted that on a number of occasions when he had installed cable from the St. Helens Cable Company the job had been accepted by customers. The St. Helens Cable Company claimed that Messrs. Foote and Milne had probably used poor casing or incompetent workmen, that a large quantity of their cable had been accepted by customers of Messrs. Foote and Milne and that the contractors should have bought a different type of cable. Judgement was given for the plaintiffs, on the grounds that 'the whole of the correspondence on both sides and the whole conduct of the defendant, and taking also into consideration reference to a similar complaint, led the Judge to the conclusion that the defendant knew that something was wrong with the cable.'[4]

The interest of this court case lies both in the fact that it was fought rather than settled out of court and in the defence of the St. Helens Cable

[1] Ibid., 1905, vol. lvii, p. 702.
[2] Garcke, *Manual of Electrical Undertakings*, 1913, vol. xvii, p. 6.
[3] Other firms also produced inferior insulation. See *Electrical Review*, 1904, vol. lv, p. 906.
[4] Ibid., 1903, vol. lii, pp. 775, 849.

Company that the contractors were wholly to blame. This shows that at least some manufacturers believed that they could successfully sell poor quality as good quality insulation. The reasonableness of this view is confirmed by the success of the St. Helens Cable Company between 1899 and 1902. The firm had started production in 1899 employing 30 staff and 250 men, had expanded rapidly and at the time of the proceedings employed a staff of 90 and 600 men. In case of cable failure, the manufacturers could claim that other factors were responsible for breakdown and could refuse to acknowledge liability.

We may conclude that around 1900 competition between rubber cable makers failed to provide purchasers with an adequate guarantee of quality.

The Success of the C.M.A. in Protecting Quality

In 1899 the British Insulated Wire Company and Callendars Cable Company, the two principal makers of mains cable, joined an informal Association of Rubber Cable Manufacturers and founded the Cable Makers Association,[1] the C.M.A. Little is known about the 'informal association of rubber cable manufacturers' which preceded the C.M.A., except that the company report of the India Rubber. Gutta Percha and Telegraph Company for 1898 stated that 'although the Board had not been able to arrange with the competitors of their French works to make a pro-rata advance in selling price, the English manufacturers had recognised the necessity of an advance'.[2]

Unfortunately information is inadequate to determine the motives of makers in founding the C.M.A. The C.M.A. claimed that their motives were 'to prevent the deterioration of the quality of India Rubber cable due to too keen competition'[3] and this claim may be valid with regard to all or at least some of the manufacturers. However, neither the C.M.A. nor the Electrical Journals appear to mention this aspect of the C.M.A. activities during the period 1899–1902 and one feels that had the manufacturers been guided solely by so noble an aim, the matter might have received greater publicity.

The purpose of this note is to show that whatever the motives for price and quota agreements, high-quality manufacture by members was a necessary consequence of price agreements. Price agreements were formulated in 1899, the C.M.A. stating 'They agreed among themselves to adopt as a minimum the competitive prices then prevailing.[3] But price agreements could be successful only provided some arrangements were agreed for sharing the market. Otherwise a firm faced with a decline in its share of

[1] *The Electrician*, 1900, vol. xlv, p. 273.
[2] *Electrical Review*, 1899, vol. xliv, p. 345.
[3] Ibid., C.M.A. Circular 1905, vol. lvii, p. 1051.

trade would be tempted to reduce prices to stimulate sales and the agreement would fail.

An agreement to share the market would lead to good quality production by member firms for two principal reasons. From the purely economic point of view the sale of inferior cable by any one member would affect the reputation of the Association as a whole and reduce the sales appeal of 'Association Cable' relative to cable from non-member firms. (From 1903 onwards certain types of cable were sold under a common C.M.A. trades mark.)[1] Therefore if any one member produced inferior quality, the other members would suffer the disadvantage of loss of reputation and sales without corresponding gains. Again, in practice, at least some of the makers would appreciate the importance to the industry of high-quality production and they would not be prepared to allocate quotas to a firm producing inferior products. Moreover, because of price agreements, members could easily afford to use good quality. In view of all these factors 'The cable of the three grades most in use were standardized . . . and for these only the best rubber was to be used, the quality varied according to the grade'.

Self interest of member firms assured compliance with C.M.A. standards. As shown above, every member to the agreement was vitally concerned that other members produced good quality. Quality adulteration by any one firm would be noticed by C.M.A. members who knew most of the cable users. Without needing conclusive legal evidence, the Association could threaten the offending member with expulsion unless he improved his product. The advantage of remaining a member of the C.M.A. and enjoying a secure and profitable market effectively encouraged high-quality production.

C.M.A. products quickly acquired an enviable reputation as shown by references in the technical press. For example, in 1906 the Liverpool Cable Company, a non-member firm, unintentionally testified to the reliability of C.M.A. products by claiming that its own cables were fully equal to those of the C.M.A.[2]

The report on the Electrical Cable Industry in 1921 summed up the attitude of purchases. The outstanding fact remains, however, that the largest users, as a rule, are entirely satisfied with the services rendered by the Associated Firms and are willing to pay a higher price for their products which they regard, rightly or wrongly, as in the nature of an insurance against interruption of electricity supply from failure in service and as a guarantee of reliability.'[3]

[1] *Electrical Trades Directory*, 1906, p. 111.
[2] *Electrical Review*, 1906, vol. lviii, p. 50.
[3] *Report on the Electrical Cable Industry*, Cmd. 1332, 1921, p. 5.

Alternative Means of Safeguarding Quality

The value of the C.M.A. contribution to high-quality manufacture depends both on the disadvantages arising from continued quality adulteration and on the possibility of developing alternative means of quality control.

The extent of quality adulteration is not known and could easily be exaggerated. The advantage of adequate quality control lay rather in the disproportionate cost to users and to the industry in general of cable failure caused by low-quality production. Cable failure would lead to the complete breakdown of the associated electric light system and could require expensive constructional work to regain access to the installed system. Poor quality cable also increased fire risks. Around 1900 electric and gas lighting were fiercely competing and repeated failures of electric light installations would have adversely affected the progress of the electric industry. Moreover, rubber competed with other materials as insulation for mains cables. Repeated failure of rubber insulation would lead to its replacement by other materials. These factors rather than the extent of quality adulteration, determined the importance of adequate quality control.

Would quality standards have been developed in the absence of price and quota agreements? We can distinguish three possibilities: the development of quality tests by users, or by an independent organization representing both users and makers, or by manufacturers. Fortunately for our inquiry, quality tests were developed in the U.S.A. by users and in Germany by a representative organization of the electrical industry. The experience in these two countries illustrates the conditions which make possible quality control by non-producer organizations.

In the U.S.A. the electricity supply industry was financed largely by private as distinct from municipal capital,[1] and individual companies could expand with little interference from the Federal Government. In particular, the Edison group of companies expanded rapidly so that, for example, in 1924 out of a total of 600 miles of cable supporting more than 20,000 volts, no less than 400 miles were owned by this group.[2]

At an early stage the Edison group of companies founded the Central Testing Laboratories to test electrical equipment including cables, and to recommend modifications, if necessary. In view of the general interest of the supply industry in the results of the Central Testing Laboratories, these laboratories passed into co-operative ownership and worked for the

[1] The revenue returns of 1902 showed that over nine-tenths of the revenues from electricity supply belonged to privately owned companies. *N.E.L.A. Proceedings*, 1914, vol. I, p. 72.

[2] Ibid., 47th Convention 1924, p. 1724.

supply industry as a whole.[1] Therefore at least one important group of purchasers, the supply industry, possessed the facilities for specifying and testing the quality of rubber insulation.

These specifications and tests did not prove entirely satisfactory because the technical problems of cable failure were not understood. By stipulating certain standards and characteristics, the supply industry encouraged the manufacture of products which passed the tests, rather than the manufacture of the most reliable insulation. In the words of a report of the National Electric Light Association published in 1928, 'Efforts in rubber insulation have apparently been towards providing a uniform product rather than towards improvements.'[2]

Thus in the U.S.A. electricity supply companies were very powerful and technically well informed, and on their own initiative developed quality standards and tests for all types of electrical equipment including rubber-insulated cables. As late as the 1920's, however, these standards had failed to establish uniform high-quality production.

By contrast, in Great Britain users lacked large-scale testing laboratories. The Electric Lighting Acts of 1882 and 1888 on the one hand had encouraged local authorities to acquire ownership of the local electricity supply systems, and on the other hand had limited the size of privately owned supply companies to the area controlled by local authority—usually a borough or a municipal council. Around 1900 the electricity supply industry consisted of a large number of smallish units, some municipally controlled and some privately controlled. The private and municipal sectors viewed each other with profound suspicion and there was little co-operation within the industry. Therefore, in Britain, the development of quality standards by the electricity supply industry was infinitely more difficult than in the U.S.A.

In Germany quality standards and tests were developed by the Verein Deutscher Elektriker—the V.D.E. A principal reason for the founding in 1893 of the V.D.E. had been a dispute between the telegraph and the electricity supply industry. At that time electricity supply cables frequently interfered with telegraphic transmission. The telegraph interests insisted that the electricity supply authorities should take adequate measures to prevent this nuisance and in 1891 the Reichstag passed appropriate legislation. The electricity supply industry felt strongly that legislation affecting electricity supply should be enacted only after full consultation with all branches of the electrical industry, and that this required the founding of a representative organization, the V.D.E.[3]

[1] Ibid., 55th Convention, 1932, p. 1065.
[2] Ibid., 51st Convention, 1928, vol. lxxxv, p. 1565.
[3] *Elektrotechnische Zeitschrift*, 1893, vol. xiv, pp. 79, 119.

The V.D.E. quickly grew in importance and became responsible in 1894 for framing national safety rules for the installation and use of electricity supply.[1] Standard electric fittings were widely needed and the V.D.E., being concerned with safety rules, suggested standards amongst others for electric bulbs in 1896, electric bulb holders in 1897, installation switches in 1899, and dimensional standards for cables in 1901. These suggestions, although not legally enforceable, were generally accepted by makers.

During the first years of the 1900's, cable users, especially the large supply companies, pressed strongly for the development of quality standards. Makers, too, thought quality tests desirable.[2] The V.D.E. having wide experience in standardization and representing the interests of the industry as a whole, proved the ideal organization for developing quality standards.

In 1909, after considerable research, standards were put forward which restricted the type of rubber to be used for insulation and stipulated a minimum rubber content of 33 per cent.[3] These standards did not directly ensure reliable service, but they eliminated the risk that a firm would try to reduce costs of manufacture by using inferior types of rubber, or too small a percentage of rubber. The cable of those manufacturers who agreed to abide by the suggestions or standards of the V.D.E. were checked by sample testing and were entitled to carry a distinctive V.D.E. mark.[4]

Thus in Germany the need to protect the interests of the electric light industry led to the formation of the V.D.E. The advantage to the industry of developing its own safety regulations stimulated V.D.E. interests in electrical standards and, in consequence, an organization evolved eminently suitable for developing quality standards and tests for rubber insulated cables.

In Great Britain, on the other hand, government legislation laid down the rights and duties of the electricity supply industry and introduced stringent safety rules. There was less need than in Germany of an organization such as the V.D.E. to represent the interests of the industry and to deal with safety requirements. The Institution of Electrical Engineers, the nearest equivalent in Britain to the V.D.E., had been founded more to discuss subjects of common interest to electrical engineers than to undertake actively the solution of technical-commercial problems. Consequently the electrical industry lacked a representative organization able and willing to develop quality tests for rubber insulation.

[1] '50 Jahre V.D.E.', *Elektrotechnische Zeitschrift*, 1943, vol. lxiv, p. 38.

[2] *Die technische wirtschaftliche Entwicklung der Fabrikation isolierter Leitungsdrähte für Starkstromanlagen in Deutschland.* H. Möllmann, Technische Hochschule, Munich, 1930.

[3] *Elektrotechnische Zeitschrift*, 1909, vol. xxx, p. 713.

[4] Ibid., p. 983.

There remains the possibility that competing makers might have safeguarded quality either by a co-operative venture or by individual firms guaranteeing quality. If the overriding consideration of makers had been to protect quality, adequate means might have been evolved. But makers are naturally concerned with the prospects of their individual business, quality is only one among many interests. Co-operative effort in developing adequate quality controls in a competitive market is quite outside usual industrial experience.

Firms could and did guarantee quality but the St. Helens Cable Company showed that guarantees were not necessarily reliable. Individual makers, in the long run, would have established a reputation for reliability. The build-up of reputation would, however, have been slower than that of the group of firms making up the C.M.A. In addition, the C.M.A. based their sales appeal on reliability and by example and exhortation raised quality standards throughout industry.

We may conclude that around 1900 competition between makers did not prevent quality adulteration of rubber insulation, that the formation of the C.M.A., including its price and quota agreements, effectively safeguarded high-quality production by members, and that within the period 1900–10 the development of other reliable means of quality control was unlikely. Consequently, price and quota agreements were an important and valuable contribution to high-quality production.

The events in the rubber cable industry around 1900 illustrate certain important aspects of the 'quality argument'. Price and quota agreements cannot be adequately defended by arguing that 'to prevent the deterioration of quality due to too keen competition makers agreed among themselves to adopt as a minimum the competitive prices then prevailing'. This defence lacks corroborative evidence and does not meet the objection that makers could have evolved some alternative means of protecting quality.

The quality argument, however, can be put rather differently. Makers agree on prices and quotas for various reasons. Whatever the reasons, successful price and quota agreements require manufacture of similar standard products by members. The standard product is of high quality partly because some makers insist that quality serves the general interest of industry and partly because reputation for quality is the principal weapon in competition with lower-priced products from non-member firms. Members check on each others products with zealous care as total association sales depend on the reputation of association products. The association can react quickly and effectively against backsliding on quality by members, by threatening expulsion. Consequently, price and quota agreements assure quality production.

In contrast, in a competitive market, quality adulteration is restrained principally by fear of loss of sales. But this restraint may operate slowly, in some instances may be uncertain and is therefore less effective.

In the great majority of cases competition may well prove an adequate safeguard of quality. But this does not affect the contention of the quality argument that price and quota agreements have certain additional features providing a better defence against quality adulteration.

IS THE NATIONAL DEBT A BURDEN? A CORRECTION

By J. E. MEADE

In my article in the *Oxford Economic Papers* for June 1958 I made a serious mistake.[1] The point which I overlooked is one which would tend to raise the money price of privately held assets after their quantity had been reduced by the capital levy. The total value of the remaining capital assets would thus be greater than I allowed in my article; but, as I argue in this note, the rise in their price would not normally be great enough to restore the total value of privately held assets to their pre-levy value. Some element of the Pigou-effect (discussed in Section II of my article) would remain.

My blunder was as follows. In Section VI of my article I argued as if the functional relationship expressing the demands for Money, Bills, Bonds, and Equities in terms of the total Money value of assets to be held and of the Money prices of Bills, Bonds, and Equities would be the same before and after the levy. But this is not so because of the lower rate of tax on interest and dividends after the levy. The gross (or *cum* tax) and net (or *ex* tax) yield on Money is always zero; with a gross yield on Bonds of 4 per cent., the net yield is 2 per cent. with a rate of tax of 10*s*. in the £ and 3 per cent. with a rate of tax of 5*s*. in the £. This means that, after the levy, income-yielding assets become so much the more attractive at any given price in terms of Money. This will cause their price to be driven up (i.e. their gross yield or the rate of interest to be driven down) not only because they are now scarce relatively to Money (the point which I made) but also because their net yield is now higher while that on Money remains zero (the point which I overlooked in my article).

Nevertheless, I think that there remains a presumption that the price of income-yielding assets (Bills, Bonds, and Equities) will not rise to the extent necessary to restore the total value of such assets to the pre-levy total. The argument may be put in the form of a *reductio ad absurdum*. Suppose that the rate of interest did fall to the extent necessary to restore the pre-levy total value of all assets. Then there are two reasons why it would rise again.

First, the net rate of yield on such assets would now be *lower* than in the pre-levy situation and this would cause people to desert income-yielding assets for Money, i.e. would cause some rise in the rate of interest. The reason for this is that, while the loss of interest on the national debt is

[1] This mistake has come to light as a result of a correspondence with Mr. John Spraos, to whom I would like to acknowledge my indebtedness.

exactly counterbalanced by a reduction of income tax (assuming income tax to be the only form of tax and a balanced budget to be maintained), the loss of interest on debt is wholly a loss of income from property but the gain through lower tax is spread over earned and unearned income. Thus the tax-free income from property is lower post-levy than pre-levy, so that if the total market value of property is to be the same post-levy as pre-levy the net rate of return on income-yielding property must be lower post-levy than pre-levy. If the tax remission were confined to the remission of tax on income from property, it might be argued that the first presumption in the capital market is that the total value of income-yielding assets will be exactly restored by a fall in the rate of interest; for in this case the amount of Money, the value of other assets, and the net yield on other assets would all remain unchanged; but in so far as some of the tax remission is on earned income the net yield on income-yielding assets is reduced and their value will tend to fall.

Second, suppose that the tax remission were confined to taxation of income from property so that the above considerations would not prevent the value of assets being restored to their pre-levy level. There would now be no Pigou-effect to cause a rise in savings and so a deflation in the demand for consumption goods, and for exactly the same reason there would be no deflationary influence damping down investment of the kind which I mentioned at the bottom of page 173 and top of page 174 in my article. But in so far as the rate of interest affects investment, there would now be an inflationary demand for investment goods because it is the *gross* and not the *net* rate of yield which affects investment incentives. So far nothing would have happened to make people expect a lower gross rate of profit on any given new investment, but the gross rate of interest would have fallen so as to keep the net tax-free rate of yield unchanged. The fall in the rate of interest would cause an inflation; and if monetary policy and not budgetary policy were used to prevent this the amount of Money would have to be reduced and the rate of interest raised again somewhat, so that the total value of assets would fall. Indeed, if on these grounds monetary policy was so devised as to keep the gross rate of interest at its pre-levy level, there would be a completely unmitigated Pigou-effect; the total value of privately held assets would fall by the amount of the levy.

The net effect of this correction is, therefore, to suggest that, while there would still be a Pigou-effect, it might be less marked than I supposed it to be in my article.

FACTOR INTENSITIES, TECHNOLOGICAL PROGRESS, AND THE TERMS OF TRADE[1]

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and

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In recent years the problems connected with the secular dollar shortage and the economic development of backward countries have aroused considerable interest in the relationship between economic growth and international trade. Theoretical analysis of the problems involved was pioneered by Professor J. R. Hicks[2] and further developed by Mr. E. J. Mishan,[3] Professor H. G. Johnson,[4] and Dr. W. M. Corden.[5]

In his contribution Professor Hicks advanced the proposition that in a two-country model with one economy growing and the other static, technological progress in the growing country would turn the terms of trade against it if the progress was concentrated mainly in the export industries or 'export-biased', and in favour of it if the progress was mainly in the import-competing industries or 'import-biased'. Professor Hicks's somewhat loosely formulated model was subjected to stricter analysis by the other authors mentioned. Mr. Mishan pointed out and analysed the importance of income effects on consumption for the direction of change in the terms of trade. Professor Johnson discussed the effects of various types of economic expansion such as population growth, capital accumulation, and technological progress on the terms of trade.

Dr. Corden clarified and refined the results of these authors by an elegant diagrammatic technique derived from Professor J. E. Meade.[6] One conclusion of his analysis is that the terms of trade must turn against the growing country in a two-country, two-commodity model if, at unchanged

[1] An earlier version of this paper was presented to a seminar in international economics at M.I.T. The authors are grateful to Professor C. P. Kindleberger and other members of the seminar for helpful criticism. Responsibility for any mistakes is borne by the authors alone. The first author is also indebted to the Ford Foundation for the award of a fellowship enabling him to study at M.I.T.

[2] J. R. Hicks, 'An Inaugural Lecture', *Oxford Economic Papers*, vol. v, No. 2, June 1953.

[3] E. J. Mishan, 'The Dollar Shortage: A Comment', ibid., vol. vii, No. 2, June 1955.

[4] H. G. Johnson, 'Economic Expansion and International Trade', *The Manchester School of Economic and Social Studies*, May 1955.

[5] W. M. Corden, 'Economic Expansion and International Trade: A Geometric Approach', *Oxford Economic Papers*, vol. viii, No. 2, Sept. 1956.

[6] J. E. Meade, *A Geometry of International Trade*, George Allen & Unwin, London, 1952.

terms of trade, the economic expansion is 'ultra export-biased', and in favour of the growing country if the expansion is 'ultra import-biased', provided that there are no inferior goods. By an 'ultra export-biased' expansion is meant one that results in an absolute decline in the domestic production of the imported commodity and by an 'ultra import-biased' expansion is meant one that results in an absolute decline in the output of the exported commodity.

This conclusion by itself is obvious since it merely states that if demand exceeds supply the relative price of the commodity must rise and vice versa. The next and more important step in the analysis is to find what types of expansion are 'ultra biased' so that the effect on the terms of trade is certain provided only that one makes the very weak assumption of no inferior goods. It is here that both Johnson and Corden employ a very useful theorem proved by Mr. T. M. Rybczynski.[1] The theorem states that under certain assumptions, an increase in the amount of one factor, with the other factor fixed, must result, at constant relative prices of the two commodities, in an absolute reduction in the output of the commodity that uses the augmented factor relatively less intensively than the other commodity in a two-factor, two-commodity economy.

Professor Johnson also discusses the effect of technological progress but makes the very restrictive assumption that factors are combined in the same proportions before and after the technological change; i.e. innovations are neither 'capital-using' nor 'labour-using' but 'neutral'.[2]

Under this assumption he states that if technological progress is confined to the production of one of the goods, then, at constant relative prices for the two goods, the absolute level of the output of the other good must decline. It is thus a further example of 'ultra-biased' expansion.

Dr. Corden asserts that by an argument similar to Mr. Rybczynski's it can be shown that if a productivity change is confined to the import-competing good in one country in a two-commodity trade model with the rest of the world static, the terms of trade must turn in the country's favour if the export good is not inferior in domestic consumption. This result follows if, and only if, the productivity change is 'ultra import-biased'. Thus Dr. Corden seems to have stated a generalization of Professor Johnson's proposition since he makes no restriction on the factor bias being neutral as Professor Johnson does.

Neither of these authors gives an explicit proof of these propositions. As our analysis will indicate, the problem of the effect of factor biased techno-

[1] T. M. Rybczynski, 'Factor Endowment and Relative Commodity Prices', *Economica* (new series), vol. xxii, No. 88, Nov. 1955.

[2] Sir Donald MacDougall has noted the importance of considering the factor bias accompanying technical progress for international trade problems. See *The World Dollar Problem*, Macmillan, London, 1957, p. 518.

logical change on the terms of trade, while similar in many ways to the question of the effect of changes in factor endowment, nevertheless presents sufficient additional difficulties to require a considerably more elaborate geometrical argument than that employed by Mr. Rybczynski. We therefore feel that even if it were true Dr. Corden's statement gives a somewhat misleading impression of simplicity to the problem so that a fuller examination would be worth while. However, the statement turns out not to be generally valid, as we shall proceed to show.

Our aim in this paper is to give a systematic analysis, by diagrammatic methods, of the effects of neutral and factor biased technological progress on the terms of trade in the framework of the familiar simplified model of only two factors, two commodities, and two countries.

The rest of the paper is divided into three parts. In Part I we analyse the shift in relative factor prices necessary to have relative product prices unchanged after technological progress has taken place in one industry and technique in the other is unchanged. In Part II we ascertain the direction of the shift in the output of the good produced with unchanged technology, at constant relative product prices, as a result of technological progress in the production of the other good. This will enable us to establish whether technological progress in one good only will always be 'ultra-biased' or not. In Part III international trade is introduced and the movement of the terms of trade as a consequence of technological progress is deduced from the preceding analysis. Our results are then related to those already in the literature.

Part I

The analytical tool of this section of the paper will be a diagram introduced by Mr. A. P. Lerner in his brilliant paper on factor price equalization in international trade.[1] In Fig. 1 an isoquant is drawn for each of two goods, which we assume to be the only goods produced in the economy. Let us call them Wheat and Textiles respectively. The axes represent Labour and Capital which are assumed to be the only two factors of production. The production functions for both Wheat and Textiles are assumed to be homogeneous of the first degree. In that case each of the isoquants will represent an infinite family, identical in shape and differing only in scale. The respective output levels for which each of the isoquants is drawn are such that they represent the equilibrium exchange ratio between the two goods prevailing in the economy.

The reader will realize that if we draw a common tangent to the two isoquants it must represent an equilibrium factor price ratio for the

[1] A. P. Lerner, 'Factor Prices and International Trade', *Economica* (new series), vol. xix, No. 73, Feb. 1952.

economy if it is assumed, as we do, that there is perfect competition with full factor mobility. In Fig. 1 the isoquants cut each other only once and so it is not possible to draw more than one such common tangent, which we have called *FG*. The Capital-Labour ratios are *OA* in Textiles and *OB* in Wheat. Since *OA* is steeper than *OB* we may call Textiles the capital-intensive, and Wheat the labour-intensive commodity. It is here that the

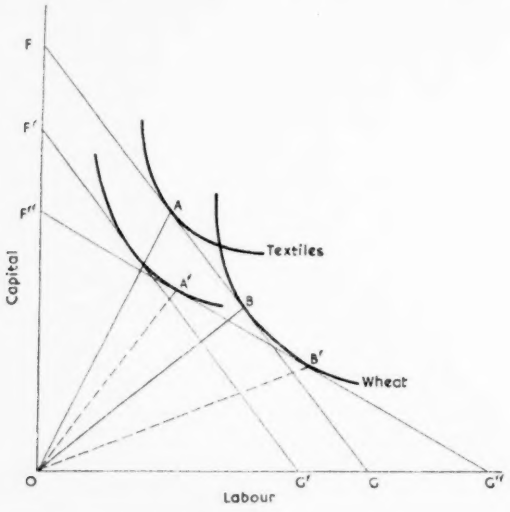

FIG. 1

importance of our assumption that the isoquants cut only once lies. If they cut twice then two common tangents could be drawn representing two possible equilibrium factor price ratios. In this case the factor intensities will reverse themselves as we move from one factor price ratio to the other. Our analysis will be confined to the original case, where the isoquants cut only once. We also rule out the case where one isoquant lies entirely within the other except at a single point.[1]

In Fig. 1 the line *FG* represents constant total cost along its entire length. The result of technological progress is to reduce the total cost of producing the same amount of a commodity. Let us suppose that there is a technological improvement in Textile production. This can be represented

[1] The concept of factor intensity has been discussed extensively in the recent literature on international trade theory. See Professor P. A. Samuelson's articles on 'International Trade and the Equalization of Factor Prices', *Economic Journal*, June 1948, and 'International Factor Price Equalization Once Again', ibid., June 1949. See also I. F. Pearce and S. F. James, 'The Factor Price Equalization Myth', *Review of Economic Studies*, 1951–2, vol. xix (2), No. 49, and R. W. Jones, 'Factor Proportions and the Heckscher-Ohlin Theorem', ibid., 1956–7, vol. xxiv, No. 63.

in Fig. 1 by the isoquant for Textiles now being tangential to a line $F'G'$, parallel to FG and indicating lower total cost at the original relative factor prices. Suppose that, as in Fig. 1, it is tangential to $F'G'$ at the point where OA cuts $F'G'$. This means that, at existing relative factor prices, the new technique has the same Capital-Labour ratio in equilibrium as the original one. Such technical progress we designate 'neutral'. The reader should note

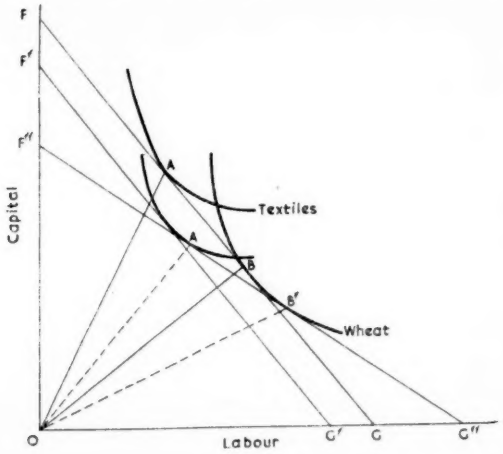

FIG. 2

that this definition of neutrality does not imply a mere renumbering of the isoquants for the commodity since the shape of the new isoquant may differ from that of the original family. For our diagram to remain independent of scale we must also assume that the new isoquants are also homogeneous of the first degree. This assumption will be made in all other cases of technological progress also.

It is clear that for the same product price ratio to prevail there must be a shift in the factor price ratio. The new factor price ratio is obtained by drawing the common tangent to the Wheat isoquant and the new Textile isoquant. As can be seen from Fig. 1 the Capital-Labour ratio must fall in both industries, to OA' in Textile and OB' in Wheat. The factor price ratio, as shown by $F''G''$, shifts in favour of Capital.

In Fig. 2 we depict the case of 'labour-using' technical progress in Textiles, since the Capital-Labour ratio in Textiles is lowered at the original relative factor prices. We have assumed that the 'labour-using' bias did not proceed sufficiently far for the new Textile isoquant and the original Wheat isoquant to intersect each other more than once. Therefore, only a single common tangent, $F''G''$, can be drawn, which indicates that the Capital-Labour ratio falls in both industries and the factor price ratio

moves in favour of Capital. Notice that at the original product price ratio the Capital-Labour ratio in Textiles falls even lower than at the same factor price ratio. The reader can show that 'capital using' technological progress in Wheat, provided that Textiles remains unambiguously the capital intensive good, will raise the Capital-Labour ratio in both industries and shift

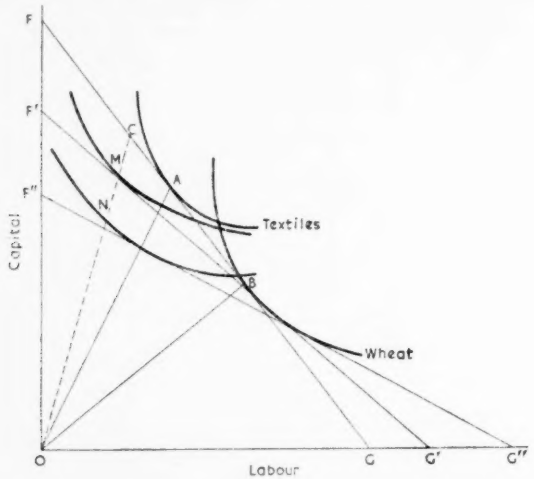

FIG. 3

the factor price ratio in favour of Labour. The Capital-Labour ratio in Wheat will be higher, at constant relative product prices, than at constant relative factor prices, after the technological change.

In Fig. 3 we consider the case of capital-using technological progress in Textiles. The dotted radial OC represents the new capital intensity of production in Textiles at FG, the original factor price ratio. The point M on OC is where a factor price line drawn parallel to FG would be tangential to the higher of the two otherwise identical new isoquants for Textiles. $F'G'$ is the common tangent to this isoquant and the Wheat isoquant. Relative factor prices have thus shifted against Labour but the Capital-Labour ratio has risen in Textiles while it falls in Wheat. Had the proportionate reduction in total costs due to technological progress been greater, however, the Capital-Labour ratio in Textiles would also fall, as can be seen by looking at the point where $F''G''$ is tangential to the isoquant which cuts O at N, which is the point at which a line parallel to FG would be tangential to it. It can be shown that labour-using technical progress in Wheat will always cause the Capital-Labour ratio in Textiles to rise, but it may rise or fall in Wheat. This completes our analysis of the shift in factor price ratios and factor proportions necessary to have relative

product prices unchanged after neutral and biased technical progress in producing either one of the goods.

Part II

In this section of the paper we shall ascertain the shift, at constant relative product prices, in the level of total output of one of the goods as a consequence of technological progress in the production of the other. We

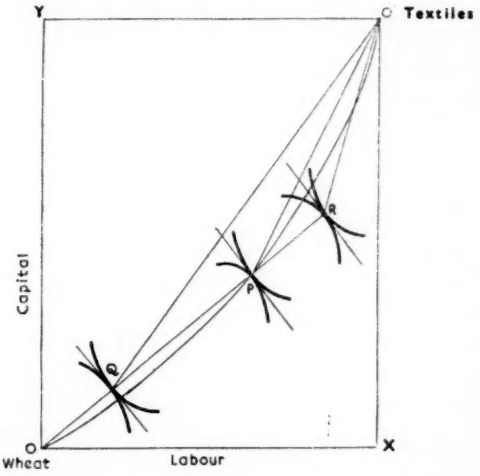

FIG. 4

assume that the supplies of Labour and Capital are fixed in amount and that each has a perfectly inelastic supply curve. As a result we can construct an Edgeworth-Bowley box diagram of production for the economy which is shown in Fig. 4.

Wheat production is measured from the lower left-hand corner of the diagram so that movement to the north-east indicates rising levels of Wheat output. The amounts of Capital and Labour used in Wheat production are measured along OY and OX respectively. Textile output is measured from the opposite corner O' and Labour used in Textile production is therefore measured along $O'Y$ and Capital along $O'X$. The solid curved line joining O and O' represents the 'efficiency-locus' which shows the maximum amount that can be produced of one good for any fixed level of the other. At any point on the efficiency-locus, such as P, a Textile isoquant is tangential to a Wheat isoquant. If a line is drawn through P, or any other point on the efficiency locus, such that it is the common tangent to both the isoquants touching at that point, its slope will indicate relative

factor prices. The way we have drawn the efficiency locus reflects our assumption that Textiles is the capital-intensive and Wheat the labour-intensive good. The point on the locus at which production actually takes places will be determined by the tastes of the society. Let us say this point is at P. The difference between P and all other points on the locus is that at this point only is the marginal rate of transformation in production equal to the marginal rate of substitution in consumption.

From Fig. 4 we see that the equilibrium Capital-Labour ratios are OP in Wheat and $O'P$ in Textiles. Suppose now that neutral technological progress takes place in Textiles. At the prevailing factor price ratio, indicated by the slope of the straight line through P, there will, by definition, be no change in the equilibrium Capital-Labour ratio in Textile production. The only change is that the point P represents a higher level of Textile output than before. The amount of Wheat produced at P is of course unchanged. Since the Wheat isoquant and the new Textile isoquant are tantential at P this point will also lie on the new efficiency-locus. The two loci will not, however, generally coincide at the other points. Only if the technological progress involves a mere renumbering of the Textile isoquants will the two loci be identically shaped.

Knowledge of the entire new efficiency locus is conveniently unnecessary for us to determine the shift in Wheat output at constant relative product prices. We know from our preceding analysis that for the product price ratio to remain constant after neutral technological improvement in Textile production the Capital-Labour ratios must fall in both industries. From Fig. 4 it is at once apparent that Wheat output must therefore contract at the same product price ratio. By identical reasoning it can be shown that neutral technological progress in Wheat will reduce the level of Textile output at constant relative product prices.

Let us now consider labour-using technological progress in Textiles. In Fig. 4 the radial $O'Q$ represents the change in the Capital-Labour ratio in Textiles at unchanged relative factor prices as a result of such a change in technique. The point Q is where the new Capital-Labour ratio line in Textiles intersects OP, the original Capital-Labour ratio line in Wheat. By the first degree homogeneity of the production functions a Wheat isoquant and a new Textile isoquant must be tangential at Q, so that Q is therefore a point on the new efficiency-locus which has the property that the factor price line passing through it has the same slope as the factor price line through P on the original efficiency-locus. It might seem surprising that relative factor prices can remain unchanged after a biased technological change in the production of one of the goods. It is easy to see, however, why this happens. The fixed factor supplies are reallocated between the two goods in such a way that the factor price ratio is left unchanged. As

can be seen from Fig. 4 this entails a reduction in the absolute amount of Wheat that is produced. From the analysis of Part I we know that for the product price ratio to remain unchanged the Capital-Labour ratio must fall in Wheat and fall even lower than $O'Q$ in Textiles. By looking at Fig. 4 we can see that this must reduce the amount of Wheat produced even lower than the output at Q. By similar reasoning the reader can show that capital-using technological progress in Wheat will cause Textile output to be reduced at constant relative product prices.

The radial $O'R$ in Fig. 4 represents the rise in the capital intensity of Textile production at the original relative factor prices as a result of capital-using technological progress in the production of that good. By the first degree homogeneity property of the production functions R indicates a point at which two isoquants are tangential and it is therefore a point on the new efficiency-locus arising from the capital-using technological change in Textiles. It shows that at constant relative factor prices the output of Wheat has increased from OP to OR. From the results of Part I we know that at the original product price ratio the Capital-Labour ratio in Wheat falls. In order to find out the direction of shift in Wheat output it is also necessary to ascertain the change in the Capital-Labour ratio in Textiles.

At this point the reader may find it convenient to refer back to Fig. 3. By looking at the lower of the two new isoquants drawn for Textiles it can be seen that the equilibrium Capital-Labour ratio in Textiles after the technical change falls below the original Capital-Labour ratio in that good. In terms of Fig. 4 this means that at a constant product price ratio the Capital-Labour ratio in Textiles must be to the left of $O'P$. The output of Wheat must therefore contract.

This, however, is by no means a necessary result. From Fig. 3 again we see that if the proportionate reduction in total cost at the original relative factor prices had been smaller, the Capital-Labour ratio in Textiles would rise above its original slope. The smaller the proportionate reduction in total cost the steeper the Capital-Labour ratio in Textiles becomes. It can never, however, exceed the slope of OC in Fig. 3 although it can approach arbitrarily close to it. It also follows from Fig. 3 that the higher the Capital-Labour ratio in Textiles after the technological change in that good, the higher will the Capital-Labour ratio in Wheat be. It is not possible, however, for it to exceed the Capital-Labour ratio at the original relative factor prices. In terms of Fig. 4 this means that at the original product price ratio it is perfectly possible for Wheat output to be very close to the level at R and therefore higher than at P. By a similar argument the reader can show that labour-using technological progress in Wheat may raise the output of Textiles at the former relative product prices.

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Part III

We may now proceed directly to the analysis of the impact of technological progress on the international terms of trade. From the box diagram the production-possibilities curve of the economy can be derived. If we are provided with an indifference map revealing the tastes of the society an offer curve can be generated which will indicate the terms on which the country is prepared to trade with the rest of the world. Assuming the offer curve of the rest of the world to be given the equilibrium terms of trade and the optimum production and consumption points for the economy can be established. Let us suppose that the country finds it profitable to import the labour-intensive good, Wheat, and export the capital-intensive good, Textiles.

Then, using the Hicks–Johnson terminology explained earlier, and assuming that neither good is inferior we have obtained the following results:

1. Neutral technological progress in Wheat is 'ultra import-biased' and in Textiles it is 'ultra export-biased'. Thus the terms of trade shift in favour of the country in the first case and against it in the second.

2. Capital-using technological progress in Wheat is 'ultra import-biased' and labour-using technological progress in Textiles is 'ultra export biased'. The movement of the terms of trade will therefore be favourable to the country in the first case and unfavourable in the second.

3. Labour-using technological progress in Wheat and capital-using technological progress in Textiles have no definite effect, at constant relative product prices, on the direction of shift in the output of whichever of the two goods is produced with unchanged technique. Since such technological changes are not, in general, 'ultra biased' in their effect, the direction of shift in the terms of trade cannot be ascertained merely on the assumption that neither good is inferior. The magnitude of the positive income elasticities will be important in determining which way the terms of trade move.

We have, however, established that the greater the proportionate reduction in total costs, at the original factor price ratio, the more likely it is that either of these types of technological change will be 'ultra biased'.

We may now relate our results to the existing literature on the problem. Our first result was stated by Professor Johnson but we have provided an explicit geometrical proof. Our second result agrees with Dr. Corden's proposition that a change in productivity, if confined to the import-competing good, will turn the terms of trade in the country's favour if the exported good is not inferior. Our third result, however, disproves his proposition and the related one that technological progress confined to the exported good must move the terms of trade against the country.

Dr. Corden employs his proposition to defend Professor Hicks from a criticism made by Mr. Mishan. Professor Hicks stated that import-biased expansion in the U.S.A., in the sense of the output of the import-competing good increasing proportionately more than the output of the exported good, would turn the terms of trade in her favour. Mr. Mishan pointed out that the nature of income effects on consumption could be such as to make it quite possible for the shift to be in the opposite direction. Dr. Corden suggests that what Professor Hicks probably had in mind was the case of practically all of the increase in American productivity being concentrated on the import-competing good and therefore 'ultra import-biased', in which case only the assumption of no inferior goods would be necessary to ascertain that the shift in the terms of trade would favour the U.S. Since our analysis has shown that technical progress confined to the import-competing good is not generally 'ultra import-biased' Mr. Mishan's criticism still stands even in this case.

In our analysis we have assumed that the rest of the world remains static. The interested reader will be able to work out the consequences of the technological progress being transmitted to the rest of the world, after the first disturbance has resulted in a new equilibrium of the terms of trade. He will find that in some cases the transmission of the technological change will lead to the initial shift in the terms of trade proceeding further in the same direction and in some cases being reversed. For reasons of space we do not consider it worth while to analyse these cases in detail here.

In conclusion we may point out that our analysis may be used to discuss the problem of the effect of technological progress on the relative shares in the national income of the factors of production.[1]

[1] There is an extensive literature on this subject in classical, Marxian, and modern economics. The major modern references are J. R. Hicks, *The Theory of Wages*, Macmillan, London, 1935, and Joan Robinson, 'The Classification of Inventions', *Review of Economic Studies*, vol. v, 1937–8, reprinted in *Readings in the Theory of Income Distribution*, Blakiston, Philadelphia, 1946. Since in our model the amounts of the factors remain fixed, the effect on relative factor shares is known once the shift in the factor price ratio has been determined.

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